

INTERIM MEASURES INVESTIGATION REPORT
ARMCO KANSAS CITY FACILITY
Volume I

March 24, 1997

Project 94-498-4-003-01/02

RCRA



61367

PREPARED BY
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**RCRA PERMITTING & COMPLIANCE BRANCH
(RCR)**



ARMCO INC.

March 24, 1997

SPECIALTY FLAT-ROLLED STEELS

P.O. Box 832

Butler, PA 16003-0832

412-284-2000

Mr. William A. Spratlin
Director, Air, RCRA and Toxics Division
United States Environmental Protection Agency—Region VII
726 Minnesota Avenue
Kansas City, KS 66101

Re: Armco Inc., Kansas City Facility
HSWA Corrective Action Permit
Permit Number MOD 007 118 029
Interim Measures Investigation Report

Dear Ms. Heiman:

Armco is submitting to EPA this Interim Measures Investigation Report in accordance with the approved Revised Interim Measures Plan dated February 1996. Enclosed are three (3) copies of the report dated March 24, 1997 which has been prepared by Burns & McDonnell Waste Consultants, Inc. of Kansas City, Missouri. This report is submitted to fulfill Armco's Permit requirements for interim measures at the Armco Kansas City Facility.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. This Report and Certification are submitted on behalf of Armco Inc.

If you have any questions concerning the enclosed Interim Measures Investigation Report, please call Myrl Wear at 816/242-5855 or me at 412/284-2267.

Very truly yours,

Daniel F. Szwed
Director—Environmental Affairs

Enclosure

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LIST OF ABBREVIATIONS AND ACRONYMS

Amoco	Amoco Oil Company
AOC	Area of Concern
Armco	Armco Inc.
AST	Aboveground Storage Tank
bgs	Below Ground Surface
BMWCI	Burns & McDonnell Waste Consultants, Inc.
CEC	Cation Exchange Capacity
cm	Centimeter
CME	Central Mine Equipment
GST	GST Steel
K	Hydraulic Conductivity
Kg	Kilogram
L	Liter
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources
mg	Milligram
msl	Mean Sea Level
PAH	Polynuclear Aromatic Hydrocarbon
Permit	Armco's current Part B Post-Closure Permit
PID	Photoionization Detector
Plan	Revised Interim Measures Plan and Associated Addendum
QC	Quality Control
QCE	Quality Control Evaluation
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
sec	Seconds
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
ug	Microgram
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

* * * * *

1.0 INTRODUCTION

An interim measures investigation was completed for five solid waste management units (SWMUs) at the Armco Kansas City Facility (Facility) in Kansas City, Missouri. The interim measures investigation was conducted at Armco's request per the Revised Interim Measures Plan (Plan) (BMWCI, February 1996) and associated Addendum No. 1 (BMWCI, October 1996). The interim measures investigation was conducted to satisfy requirements presented in Section XXXI, Part II of Armco's Part B Post-Closure Permit (Permit). This document presents the results and conclusions of the interim measures investigation.

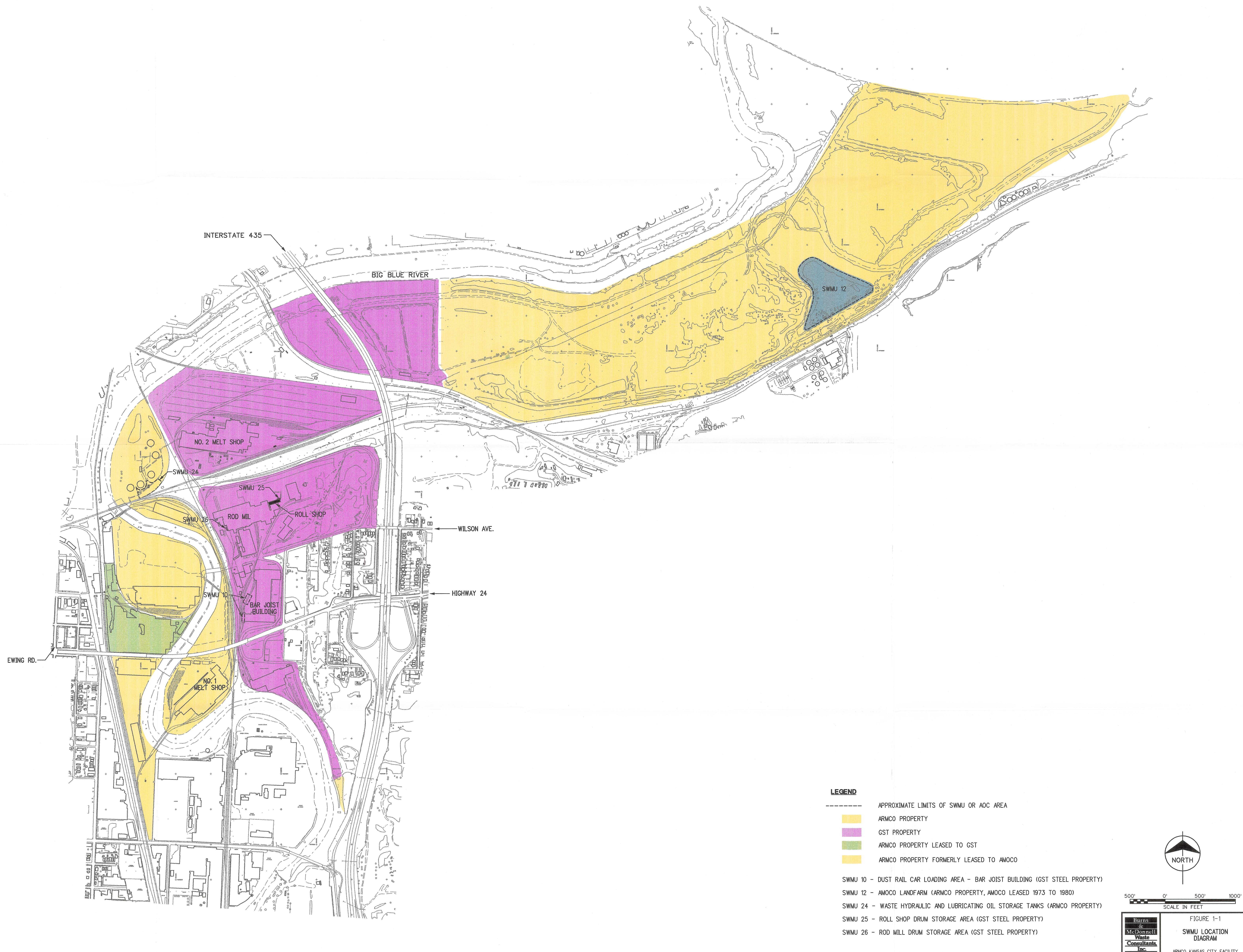
As used in this document, the term "Facility" is broader than the definition of facility used in the Permit. Pursuant to a November 12, 1993 Stock Transfer Agreement between Armco and GS Technologies Corporation (now operated as GS Industries), Armco transferred to GS Technologies Operating Company, Inc., doing business as GST Steel (GST), property on which are located SWMUs and areas of concern (AOCs) which were identified in or pursuant to the Permit. In order to address these SWMUs and AOCs, the term "Facility", as used in this document, includes the property designated as the facility in the Permit as well as these SWMUs and AOCs. Wherever possible, reference is made to the appropriate property owner when discussing a particular SWMU, AOC, or operation.

The Permit identifies the following five SWMUs for interim measures: SWMU 10 (Dust Railcar Loading Area - Bar Joist Building), SWMU 12 (Amoco Landfarm), SWMU 24 (Waste Hydraulic and Lubricating Oil Storage Tanks), SWMU 25 (Roll Shop Drum Storage Area), and SWMU 26 (Rod Mill Drum Storage Area). The location of each SWMU is shown on Figure 1-1. SWMUs 10, 25, and 26 are located on land owned and controlled by GST. For these SWMUs, Armco limited its investigation to contamination arising from usage prior to the sale of the property to GST. SWMU 12 is the former landfarm operation utilized by Amoco Oil Company (Amoco), and SWMU 24 is located on land owned and controlled by Armco.

Typically, the purpose of interim measures activities is to mitigate the immediate or imminent threat to human health and the environment posed by releases of hazardous waste from a facility. For this interim measures investigation, the objectives were to collect data concerning the nature and extent of contamination at each SWMU and then, based on this data, determine whether additional interim measures activities are necessary to reduce or eliminate risk to human health or the environment. The collection of nature and extent data not only fulfilled the interim measures need but also helped to fulfill Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) objectives. Objectives for the upcoming RFI include collecting information to aid in defining the source of contamination, defining the nature and extent of contamination, and identifying actual or potential receptors.

Details concerning the interim measures investigation conducted at SWMUs 10, 12, 24, 25, and 26 are addressed in this report. Section 2 describes the regional geology and hydrogeology as well as the geology and hydrogeology specific to the Facility. Section 3 presents each SWMU's operational history, investigation activities, nature and extent of contamination, and planned interim measures or future investigation activities (if any). Section 4 presents the conclusions for this interim measures investigation.

* * * * *



2.0 GEOLOGY AND HYDROGEOLOGY

Regional geology and hydrogeology as well as Facility geology and hydrogeology are described in this section. Regional geologic and hydrogeologic information was gathered from several referenced sources. Available Facility-specific geologic and hydrogeologic information is limited. Information presented in this section was collected during past subsurface investigations of the Facility including this interim measures investigation. Additional geologic and hydrogeologic information will be collected during the RFI.

2.1 GEOLOGY

2.1.1 Regional Geology

The Facility is located at the approximate midpoint of a 150-mile-wide band of Pennsylvanian age sedimentary rock outcropping in a north-south direction through western Missouri and eastern Kansas (Parizek and Gentile, 1965). Within this band, more than 300 vertical feet of sedimentary rock belonging to the Pleasanton, Kansas City, Lansing, and Douglas Groups are exposed. The primary rock types comprising these groups include interbedded shale and limestone, claystone, and coal with locally prominent fine-grained sandstone.

Regionally, bedrock units dip gently (10 to 20 feet per mile) westward off the Ozark uplift and toward the Forest City Basin. In the Kansas City area, this regional structure is modified by the northwest trending Penn Valley Syncline, Bannister Ridge Anticline, and Centerview-Kansas City Anticline.

The uppermost bedrock units underlying the Facility are part of the Pleasanton Group. The Pleasanton Group consists predominantly of clayey shales and sandstones with minor occurrences of limestone and coal (Thompson, 1995 and Zeller, 1968). These mainly clastic sediments were derived from terrestrial origins and deposited in shallow seas. The Pleasanton Group ranges in thickness from approximately 20 to 150 feet. Figure 2-1 is a stratigraphic column of the Pleasanton Group (Thompson, 1995).

Unconsolidated deposits of alluvial, glacial, aeolian, and residual origin constitute the youngest geologic materials in the region (Hasan et. al., 1988). Major alluvial deposits occur along the Missouri and Kansas rivers as well as their tributaries. The alluvium tends to coarsen with depth and is generally composed of clays, sands, and gravels. Loess (wind-blown silt) deposits with thicknesses over 100 feet occur within the region. In general, these deposits are thickest north of the Missouri and Kansas Rivers and gradually thin to the south. The Kansas City area is located at the southern limit of Pleistocene glaciation. Glacial till covers much of the area north of the Missouri and Kansas rivers and is present at several localities south of the rivers. Glacial till is an unstratified, heterogeneous mixture of clay, silt, sand, gravel, and boulders deposited during glacial retreat.

2.1.2 Facility Geology

The Facility is located on the flood plain of the Missouri River, near it's confluence with the Blue River. The flood plain is blanketed with Quaternary-age alluvium (Anderson, 1979). The natural top soil at the Facility has been classified by the Soil Conservation Service as belonging to the Bremer, Haynie, Parkville, Zook, and Gilliam soil series. These soils range from silty clay loams to stratified fine sandy loam. The pH of the top soil ranges from 5.6 to 8.4, and the shrink-swell potential for these soils ranges from low to high (Preston, 1984). Appendix A contains the soil survey map for the Facility along with the associated legend of soil types.

Slag, a byproduct of steel production, is present in the fill material throughout the Facility. Slag is the surface crust which forms by crystallization of impurities during the cooling of molten steel. Slag is composed primarily of silica, carbon, and calcium carbonate, with varying levels of metals. Slag has been used extensively as a fill material at various locations at the Facility along with associated debris such as refractory brick fragments. The slag fill material at the Facility is classified according to the Unified Soil Classification System (USCS) as GM, GC, or SM. During the interim measures investigation, slag was encountered at SWMUs 12, 24, and 25 to the following depths:

- SWMU 24 - 7 to 10 feet
- SWMU 25 - 4 to greater than 7 feet
- SWMU 12 (berms) - 2 feet

According to boring logs obtained from Burns & McDonnell and d'Appolonia Consultants (Burns & McDonnell, 1994), the alluvial deposits in the area of the Facility consist of silty clays in the upper portion of the subsurface which grade with depth into silty sand, sand, and gravel. The USCS classifications for the soils at the Facility are CH, CL, CL-ML, ML, SC, SM, SP, GC, and GM. The alluvial deposits are generally lenticular and are not laterally continuous. The elevation and composition of some strata will vary significantly across horizontal distances of several thousand feet.

Subsurface investigations were conducted at the RCRA Landfill which is located along the Blue River east of Interstate Highway 435 in the northeast portion of the Facility (Burns & McDonnell, 1994). These investigations characterized the alluvium as a sequence of near-surface clayey silts and silty clays which coarsen downward to sands and gravels in the lower portion of the alluvium. The near-surface silty clays and clayey silts grade into fine sand at a depth of approximately 15 to 25 feet below ground surface (bgs). At a depth below 30 to 35 feet bgs, the soils grade to coarse sands and gravels.

Monitoring well borings installed at the former Amoco Landfarm (SWMU 12) as part of this investigation penetrated through alluvial sediments to bedrock. The subsurface at SWMU 12 is characterized by a fining upward sedimentary sequence. Clays and silts are predominant to a depth of 15 to 35 feet bgs at which point very fine to coarse grain sands become more predominant. Depth to bedrock at SWMU 12 ranges widely over a short distance (25 feet bgs in Boring 12MW1 to 53 feet bgs in Boring 12MW2) which is indicative of well-developed paleorelief on the pre-depositional bedrock surface.

Beneath the alluvial materials at the Facility is an unnamed shale of the Pleasanton Group. This unnamed shale has an average thickness of 25 feet throughout western and northern Missouri

(Thompson, 1995). Bedrock can be found at an approximate depth of 25 to 100 feet bgs or at an elevation of approximately 630 to 705 feet above mean sea level (msl). The Facility is not located in a fault area which has experienced displacement during the Holocene period. Seismic instability is not expected at the Facility.

2.2 HYDROGEOLOGY

2.2.1 Regional Hydrogeology

Groundwater flow along the Missouri and Blue Rivers is expected to be primarily within the river alluvium. The Pleasanton Group which underlies the river alluvium is considered an aquitard throughout the area of the Facility and in much of western Missouri. As a result, an interconnection between the alluvial aquifer and deeper water bearing units is not expected.

Groundwater flow direction in the alluvial setting of the Facility is controlled primarily by the Blue River. During normal conditions, groundwater flow is expected to be toward the river or down gradient along the Blue River channel. Groundwater will discharge to the Missouri or Blue Rivers or will follow the alluvial aquifer along the Missouri River. During periods of rapidly rising stream levels within the Blue River, the hydraulic gradient may reverse causing groundwater to flow away from the Blue River. These periods of flow reversal are expected to be short in duration. Recharge to the alluvial groundwater system can occur from the Blue River, the Kansas City Group formations which form bluffs along the Blue River flood plain, and the infiltration of precipitation on flood plain areas.

2.2.2 Facility Hydrogeology

Surface drainage at the Facility is controlled by the Missouri and Blue Rivers. Virtually all of the Facility is within the 100-year flood boundary, and the extent of the 100-year flood plain is shown in Figure 2-2. Facility surface drainage outfall locations are shown on the drainage basin maps contained in Appendix A2 of the revised RFI Workplan (BMWCI, 1997).

Water level data collected at the Facility indicates that the piezometric surface elevation is low in the winter and spring and is higher during the summer and fall. These seasonal fluctuations

correspond with the low and high stages of the Missouri River. Although the piezometric surface varies seasonally, it is generally found from 5 to 10 feet bgs. Review of historical groundwater data for the closed RCRA Landfill indicates that groundwater elevations at that location have ranged from approximately 712 to 722 feet above msl (Burns & McDonnell, 1991).

As a part of the first phase of the South Riverfront Expressway investigation, hydrogeologic properties for the northeastern portion of the Facility east of Interstate Highway 435 were summarized from hydrologic data from monitoring wells located around the closed RCRA Landfill. Figure 2-3 shows the location of the South Riverfront Expressway investigation. The report (Burns & McDonnell, 1991) for the first phase of the South Riverfront Expressway investigation indicates that groundwater in this area flows from the southeast. Flow paths diverge beneath the western portion of this area with some of the groundwater flowing northward to the Missouri River and some being diverted to the west into a cone of depression developed by the dewatering of the Rock Creek Railroad Tunnel located southeast of the Mill Ponds (SWMU 22). Water collected from the dewatering effort is discharged to Outfall No. 046. In general, the piezometric surface in this area slopes north or northwest at an approximate gradient of 0.002. The cone of depression formed by the dewatering of the Rock Creek Railroad Tunnel may reverse or alter the groundwater flow direction in the western portion of the area. Calculations of hydraulic conductivity (K) values for the alluvium in this area have been made based on consolidation tests and on grain size (Hazen's Formula). The K value was found to vary from 1.5×10^{-8} centimeters/second (cm/sec) in the upper clay layer to 5×10^{-5} cm/sec in the lower silty sand stratum. Cleaner, coarser sand overlying the bedrock surface may have a K value in the range of 10^{-2} cm/sec.

A contour map of the SWMU 12 water levels indicates a groundwater trough may exist with flow toward the west (Figure 2-4). Water levels recorded on February 14, 1997 ranged from 713.74 feet to 717.77 feet above msl. This trough may be a result of bedrock exerting localized control over the water table. The lowest water table elevation (713.74 feet above msl) is

associated with the lowest known bedrock elevation (680.2 feet above msl) in this area in Monitoring Well 12MW2.

* * * * *

PENNSYLVANIAN SYSTEM

MISSOURIAN
SERIES

KANSAS CITY GROUP

PLEASANTON GROUP

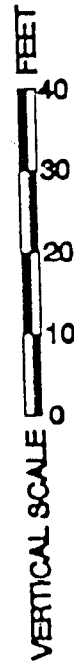
UNNAMED MBR.
UNNAMED
FORMATION

KNOB TOWN FACIES*
WARRENSBURG
SS. MBR.

UNNAMED
FORMATION
UNNAMED SH. MBR.

EXLINE LS. MBR.
UNNAMED MBR.

UNNAMED
FORMATION
HEPLER SS. MBR.



APPROXIMATE
POSITION
BLUE RIVER
VALLEY FLOOR

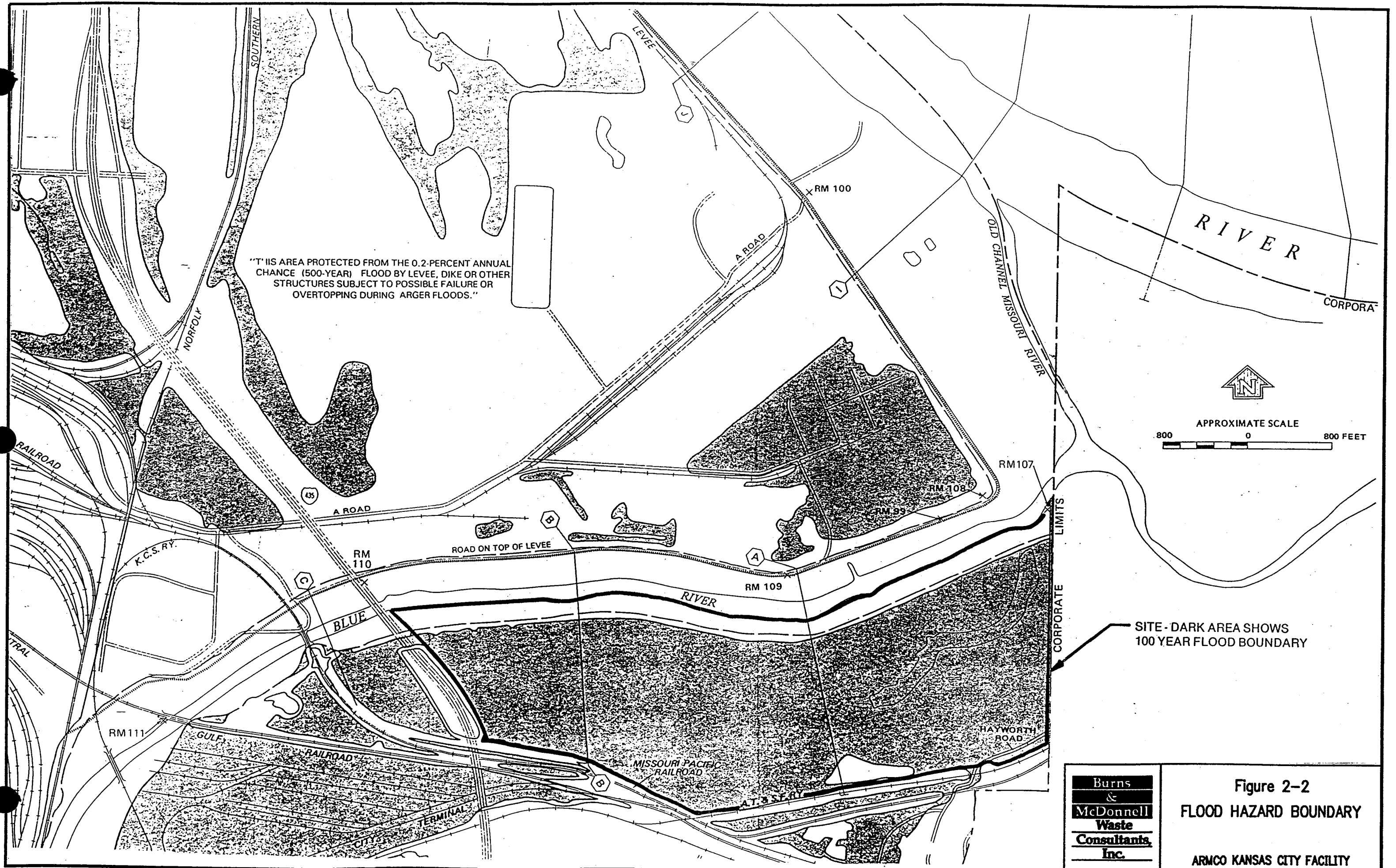
MARMATON GROUP

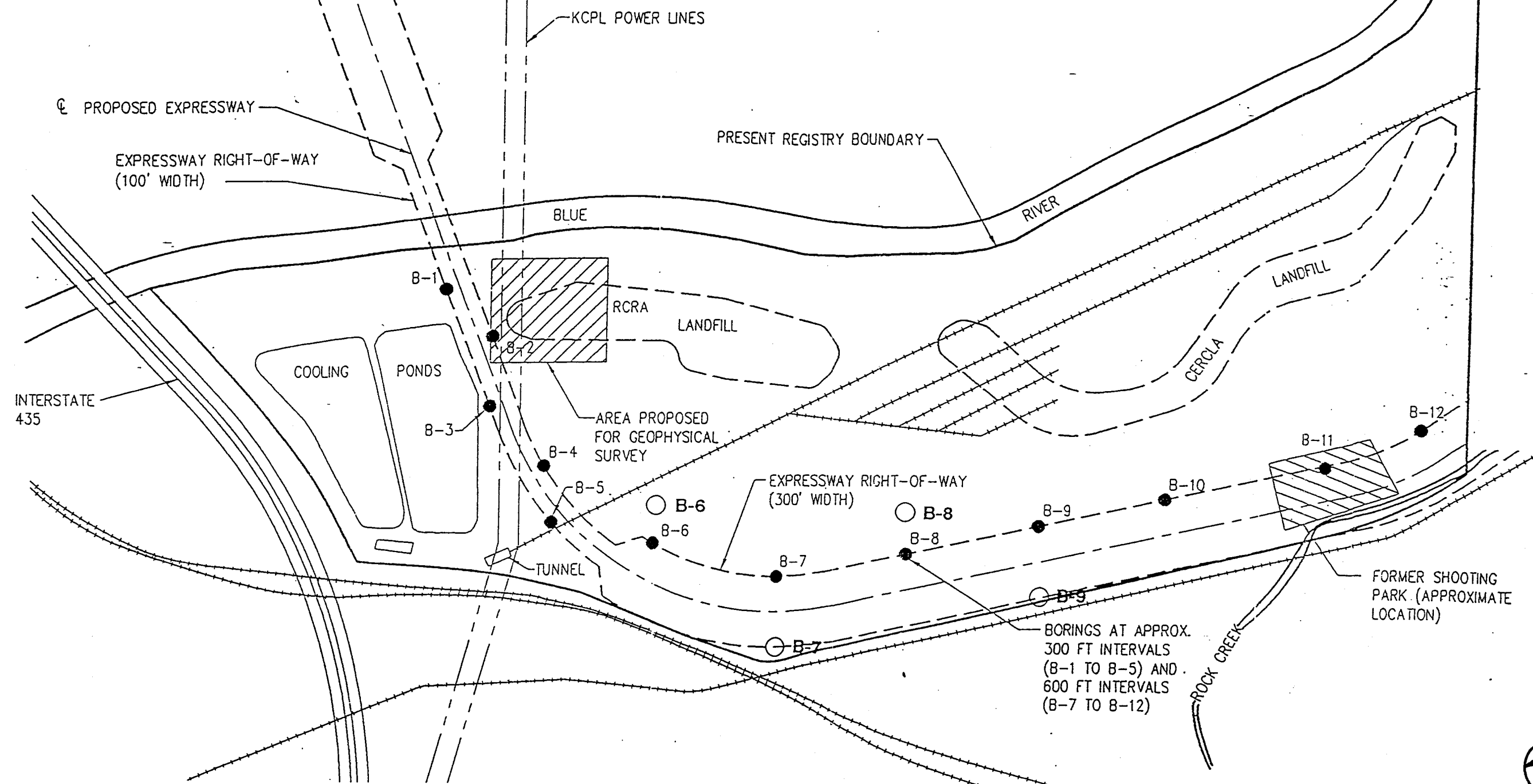
ADAPTED FROM THOMPSON, 1995.

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Inc.

Figure 2-1
PLEASANTON GROUP
STRATIGRAPHIC COLUMN

ARMCO KANSAS CITY FACILITY





TAKEN FROM WOODWARD-CLYDE, 1994.

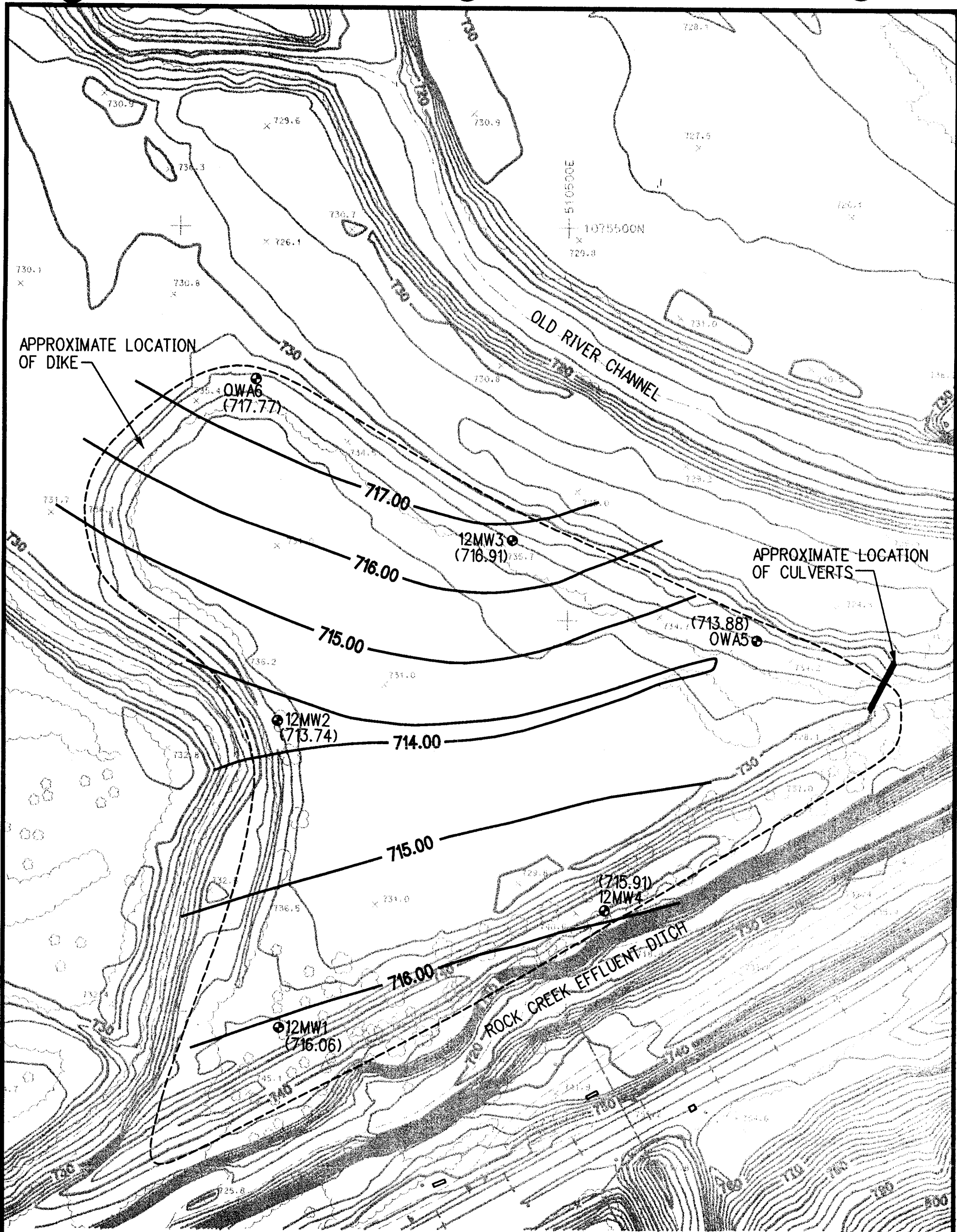
LEGEND:

- B-1 BORING LOCATIONS
- B-6 REVISED BORING LOCATIONS

**Burns
&
McDonnell
Waste
Consultants
Inc.**

Figure 2-3
SOUTH RIVERFRONT
EXPRESSWAY STUDY AREA
ARMCO KANSAS CITY FACILITY

NOT TO SCALE

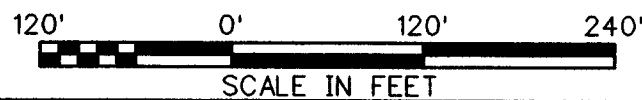


LEGEND

- MONITORING WELL LOCATION
- +—+— RAILROAD TRACK
- - - - - APPROXIMATE LIMITS OF SWMU 12
- 715 GROUNDWATER CONTOUR
- (717.77) GROUNDWATER ELEVATION

NOTE:

GROUNDWATER ELEVATIONS MEASURED ON 2-14-97.



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Waste
Consultants
Inc.**

**Figure 2-4
SWMU 12
SAMPLING LOCATIONS**

ARMCO KANSAS CITY FACILITY
AMOCO LEASED PROPERTY

3.0 INTERIM MEASURES INVESTIGATION

This section describes the interim measures investigation which was undertaken to help fulfill the requirements of Armco's current Part B Post-Closure Permit (Permit). During the interim measures investigation, SWMUs 10, 12, 24, 25, and 26 were addressed. Each SWMU's operational history, investigation activities, nature and extent of contamination, and planned interim measures or future investigation activities, if any, are described below. All procedures followed during the interim measures investigation are described in Sections 3.0 and 4.0 of the Plan.

This section also includes evaluations of validated laboratory analytical data. Chain of Custody forms for the laboratory analytical data are contained in Appendix I, and analytical laboratory reports are contained in Appendix J. The quality control evaluation (QCE) report describing the data validation process of this data is contained in Appendix B. For each SWMU, validated analytical data was reviewed to determine whether future investigation or remedial activities were necessary.

Future investigation and remedial activities will be completed at the Facility. Future remedial activities described in this section will be performed to fulfill the objectives of interim measures. Future investigation activities will be performed and reported as a part of the RFI rather than as part of interim measures. Future investigation activities will be performed to fulfill RFI objectives such as further defining the nature and extent of contamination and determining potential risk to human health and the environment.

3.1 SWMU 10 - DUST RAILCAR LOADING AREA - BAR JOIST BUILDING

3.1.1 SWMU 10 Description

The Dust Railcar Loading Area (SWMU 10), located on GST property (Figure 1-1), was a railcar loading station for emission control dust from the No. 1 and No. 2 Melt Shops. During the SWMU's operation between 1986 and May 1991, approximately 70,000 tons of emission control dust were transported off-site for disposal.

When emission control dust handling operations ceased in 1991, residual emission control dust was removed from the SWMU, and the floor and walls of the Bar Joist Building were cleaned. It is not anticipated that significant releases to the environment occurred due to the fact that the majority of the area around the rail lines where loading occurred was covered with pavement throughout the operational life of the SWMU. Weekly inspections performed by an Armco representative to assess the integrity of SWMU 10 did not document any releases to the environment.

3.1.2 SWMU 10 Investigation Activities

During the SWMU 10 investigation, surface soil samples were collected from six grids located in the area along the west wall of the building (Figure 3-1). Composite samples were collected from each sample grid at depth intervals of 0 to 6 and 6 to 12 inches bgs. Each sample was the composite of four aliquots collected from the sample grid.

SWMU 10 surface soil samples were analyzed for cadmium and lead. In addition, Samples 10G3/SR1 and 10G6/SR1 were selected for Toxic Characteristic Leaching Procedure (TCLP) testing based on their lead and cadmium concentrations. The results of the TCLP testing were used to determine if the surface soil collected from SWMU 10 would be classified as a hazardous waste based on its toxicity characteristic.

3.1.3 SWMU 10 Nature and Extent of Contamination

Surface soil sample results for lead and cadmium are summarized in Table 3-1. Cadmium and lead results ranged from 13 to 141 milligrams/Kilograms (mg/Kg) and from 473 to 5,860 mg/Kg, respectively. The highest concentrations of both lead and cadmium were detected in Samples 10G6/SR1 and 10G6/SR2. Concentrations of lead increased from the south to north. In general, cadmium and lead concentrations decreased with depth. TCLP testing was performed for Samples 10G3/SR1 and 10G6/SR1. TCLP sample results for lead and cadmium are summarized in Table 3-2. The TCLP limits for cadmium (1 mg/L) and lead (5 mg/L) were not exceeded in either of the samples.

Typical background ranges of RCRA metals in soil are given in Table 3-3. Cadmium and lead levels shown in Table 3-1 are elevated compared to the ranges given in Table 3-3. These elevated levels may be due to the presence of slag backfill rather than metals contamination associated with SWMU operations. Since only surface soil was sampled at SWMU 10, the presence of slag backfill was not confirmed although a gray gravel was encountered.

3.1.4 Further SWMU 10 Interim Measures Activities

The Permit requires that the following interim measures activity be completed for SWMU 10:

- Clean and assess the integrity of the SWMU to prevent the movement of wastes into the environment.

Although SWMU 10 was cleaned after dust handling operations ceased, elevated lead levels are still present in the SWMU's surface soil, and potential exists for worker exposure. Conditions at SWMU 10 may not represent a short-term, immediate concern; however, Armco plans to proceed with further cleanup activities involving the excavation of surface soil. A workplan detailing the proposed cleanup activities at SWMU 10 will be submitted within 60 days of the date of this report.

3.2 SWMU 12 - AMOCO LANDFARM

3.2.1 SWMU 12 Description

The Amoco Landfarm (SWMU 12), located on Armco property (Figure 1-1), was leased by Amoco for the landfarming of petroleum refining waste generated at the Amoco Sugar Creek Refinery. Approximately 30,000 tons of petroleum refining waste were placed within the 10 acre landfarm between 1975 and 1979. The only known waste activity conducted by Armco involved a one-time land application of liquid and sludge sediment generated during the cleaning of a No. 2 fuel oil tank. Although the exact quantity of material associated with this activity cannot be determined, it is not anticipated to have exceeded a few hundred gallons.

No documented spills are known to have occurred at this SWMU, but associated management practices involved direct contact of petroleum refining waste with surface water and surface soil. Surface water within the SWMU was controlled by two culverts and a dike surrounding the SWMU. Surface water was discharged from the area through the two culverts; however, no information is available regarding the quality or quantity of water discharged. Volatile contamination may also have been released to the air during the SWMU 12 operation.

During the flood of 1993, SWMU 12 was covered by flood waters and may have been affected by water and silt carried in during flood conditions. The surface of SWMU 12 does not appear to be eroded; however, the presence of sediment deposited during flood conditions is evident.

3.2.2 SWMU 12 Investigation Activities

Investigation activities at SWMU 12 focused on determining the presence of contamination in the groundwater and providing information regarding groundwater flow direction. This information was obtained by collecting groundwater samples and water level data from existing and newly installed monitoring wells. Limited soil sampling from monitoring well borings was also completed for physical and chemical analyses. Subsurface soil for chemical analysis was collected from borings where signs of soil contamination were present. Subsurface soil for physical analysis was collected at the locations specified in the Plan.

3.2.2.1 Monitoring Well Installation

Four additional monitoring wells (Monitoring Wells 12MW1 through 12MW4) were installed at SWMU 12 (Figure 2-4) to supplement existing Monitoring Wells OWA5 and OWA6. New monitoring well borings were sampled to their final depth using a Central Mine and Equipment (CME) continuous sampler or a split spoon sampler in order to develop a vertical profile of the overburden. Monitoring well boring logs are located in Appendix C.

Although only one bedrock boring was originally planned, three of the four additional monitoring well borings (Borings 12MW1, 12MW2, and 12MW4) were drilled to shale bedrock which was encountered between 25.5 and 53 feet bgs. Monitoring well borings were drilled to bedrock to

better define the bedrock surface which was encountered at shallower depths than originally expected.

Each monitoring well was constructed in its original boring except Boring 12MW2 which reached a final depth of 53 feet. For Boring 12MW2, a second boring located six feet to the south of the original boring was drilled to 25.5 feet. The original Boring 12MW2 was backfilled and was not used for monitoring well installation because the backfilled grout could have interfered with the performance of the monitoring well. Monitoring well construction diagrams are contained in Appendix D. Monitoring wells were installed per the Missouri Department of Natural Resources (MDNR) monitoring well installation regulations. The MDNR monitoring well certification records are included in Appendix E.

Improvements were made to the two existing monitoring wells (Monitoring Wells OWA5 and OWA6). New concrete pads and protective casings were installed. Since records were not available detailing the construction of these wells, the screens of the wells were measured using a measuring tape and mirror lowered into the well casings. The screens in Monitoring Wells OWA5 and OWA6 appear to be approximately 10 feet in length.

3.2.2.2 Subsurface Soil Sampling

Six subsurface soil samples were collected from Borings 12MW1 and 12MW3 to determine the general physical and chemical characteristics of the subsurface materials at the SWMU. To differentiate these types of samples from those associated with contaminant characterization, these analyses are typically referred to as physical analyses. Three of the six soil samples were collected using Shelby tubes instead of a CME-type sampler or a split-spoon sampler. Shelby tube samples were taken in cohesive soils. Physical analyses results are discussed in Subsection 3.2.3.

Four subsurface soil samples were collected from Borings 12MW3 and 12MW4 and analyzed for chemical analyses of total petroleum hydrocarbons (TPH), lead, trivalent chromium, hexavalent chromium, and the Skinners List of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). These soil samples were not included in the Plan but were added due to

odor and elevated photoionization detector (PID) readings. Results of these analyses are discussed in Subsection 3.2.3. Further soil sampling for chemical analyses will also be performed at this SWMU as planned in the RFI Workplan (BMWCI, 1997).

3.2.2.3 Monitoring Well Development and Groundwater Sampling

Prior to the groundwater sampling activities at SWMU 12, all new and existing monitoring wells were developed in accordance with the Plan. Sample collection was performed two days after well development activities were completed. Well development forms are contained in Appendix F.

All six monitoring wells were purged prior to groundwater sampling. A groundwater sample was collected from each monitoring well and analyzed for TPH, lead, trivalent chromium, hexavalent chromium, and the Skinners List of VOCs and SVOCs. Results of these analyses are discussed in Subsection 3.2.3.

3.2.2.4 Groundwater-level Measurement

A complete round of groundwater-level and total-depth measurements were taken after all the wells had recovered following development and groundwater sampling activities. Groundwater levels and total well depths measured on February 14, 1997 are shown in Table 3-4. Figure 2-4 displays the groundwater elevation contours as interpreted based on the data from Table 3-4.

3.2.3 SWMU 12 Soil Physical Properties

Six soil samples were submitted for the following physical property testing: sieve analysis, Atterberg limits, moisture content, total organic carbon (TOC), and cation exchange capacity (CEC). The results of these analyses are summarized in Table 3-5, and the physical laboratory report is contained in Appendix G. Further physical testing is planned as part of the RFI. The results from this investigation will be incorporated into the RFI data evaluation.

These physical analyses results help to further define the Facility's hydrogeologic environment. Although further physical testing will provide additional information, the following preliminary

conclusions may be made from the data in Table 3-5. Based on sieve analysis and Atterberg limits results, the overburden is characterized as fine deposits grading with depth to coarse deposits. The TOC content is an indicator of the relative mobility of organic contaminants in the subsurface environment. TOC results were moderately high which indicates organic contaminants may have a higher tendency to be absorbed to soil particles. The CEC is one indicator of the mobility of metal ions within the subsurface environment. The higher the CEC of a soil, the less mobile a metallic ion will be within that environment. In general, the CEC values for the Facility are low to moderate (Dragun, 1988), decreasing with depth and with decreasing soil clay content. This trend in CEC values may indicate a relatively higher mobility for metallic constituents in the subsurface beneath SWMU 12. However, it should be noted that migration of metallic constituents is complex and cannot be characterized by a single indicator such as CEC.

3.2.4 SWMU 12 Nature and Extent of Contamination

3.2.4.1 Subsurface Soil

Subsurface soil sample chemical results for SWMU 12 are summarized in Table 3-6. Skinner's VOCs, Skinner's SVOCs, and hexavalent chromium were not detected in any of the samples. TPH (extractable) results ranged from non-detectable levels to 14.9 mg/Kg, and TPH (volatile) results ranged from non-detectable levels to 0.204 mg/Kg. Trivalent chromium results ranged from 6.92 to 14.7 mg/Kg; lead results ranged from non-detectable levels to 26 mg/Kg. The highest concentrations of trivalent chromium and lead were detected within Sample 12MW4/CS1, the shallowest sample collected. Detections of trivalent chromium and lead were within typical background ranges for metals in soil given in Table 3-3.

3.2.4.2 Groundwater

Groundwater sample chemical results are summarized in Table 3-7. Skinner's VOCs, TPH (volatile), dissolved trivalent chromium, dissolved hexavalent chromium, and dissolved lead were not detected in any of the samples. Bis(2-ethylhexyl)phthalate, one of the Skinner's SVOCs, was detected in Sample 12MW1/GW1 at 26.5 micrograms/Liter (ug/L) and Sample 12MW3/GW1 at an estimated concentration of 4 ug/L; however, bis(2-ethylhexyl)phthalate is considered by the United States Environmental Protection Agency (USEPA) to be a common laboratory

contaminant (USEPA, 1989). TPH (extractable) results ranged from non-detectable levels to 1.72 mg/L.

3.2.5 Further SWMU 12 Interim Measures Activities

To comply with Permit requirements, a groundwater monitoring system was installed at SWMU 12, and groundwater samples were collected and analyzed for potential contaminants. Based on the results of these analyses, risk to human health and the environment does not warrant further interim measures activities for this SWMU. Further interim measures activities are not warranted since the levels of contamination are relatively low and potential for receptor exposure is limited. Although no further interim measures activities are proposed, surface and subsurface soil samples will be collected during the RFI. These samples will be analyzed for Skinner's VOCs, Skinner's SVOCs, TPH, trivalent chromium, hexavalent chromium, and lead. The results from these future analyses will be combined with the soil data from this interim measures investigation to further define the nature and extent of soil contamination at SWMU 12.

As stated in the Plan, future groundwater monitoring activities will be based on the nature and extent of contamination defined during the interim measures and RFI investigations. The need for continued monitoring of SWMU 12 monitoring wells will be evaluated following the RFI investigation.

3.3 SWMU 24 - WASTE HYDRAULIC AND LUBRICATING OIL STORAGE TANKS

3.3.1 SWMU 24 Description

The Waste Hydraulic and Lubricating Oil Storage Tanks (SWMU 24), located on Armco property (Figure 1-1), functioned between 1975 and 1993 as a waste oil collection system for the entire Facility. Waste oil of various types was brought to the area in drummed containers or 600 gallon waste oil "tote boxes". Until 1991, the waste oil from SWMU 24 was incorporated into the heating oil supply; however after November 1991, waste oil was sent off site for fuel blending.

The amount of waste oil handled at SWMU 24 varied. In 1986, the approximate quantity of waste oil managed at the SWMU was 30,000 gallons. If this quantity represents an average

amount of waste oil managed at the SWMU on a yearly basis, the total amount of waste oil managed over the life of the SWMU would be approximately 330,000 to 360,000 gallons.

When the SWMU was removed from service in 1993, all of its components were cleaned, and the majority of parts were dismantled and removed. The two aboveground storage tanks (ASTs) at SWMU 24 were cut up and recycled in 1996.

During the SWMU's operational lifetime, releases may have occurred through the transfer of waste oil from hoppers and drums into the dump station, leaking drums and hoppers, or releases from the waste oil collection system. No documented spills are known to have occurred. Since all SWMU components have been cleaned and dismantled, there is no ongoing risk of release of waste oil to the environment.

3.3.2 SWMU 24 Investigation Activities

During the subsurface investigation activities at SWMU 24, the nature and extent of contamination was assessed through the collection of surface and subsurface soil samples and through visual observation associated with the completion of a series of exploratory trenches.

3.3.2.1 Surface Soil Sampling

A total of eight surface soil samples were collected from four sampling grids (Figure 3-2). According to the Plan, surface soil samples were to be collected from only three sampling grids. However, four grids were sampled since the two waste oil ASTs present when the Plan was developed have since been removed from the SWMU. Each surface soil sample was a composite of four aliquots collected across a sampling grid. Samples were collected from each sampling grid at 0 to 6 and 6 to 12 inches bgs. Surface soil samples were analyzed for VOCs, polynuclear aromatic hydrocarbons (PAHs), TPH, and RCRA metals.

3.3.2.2 Subsurface Soil Sampling

In addition to surface soil sampling, subsurface soil samples were collected from exploratory trenches. Six exploratory trenches were completed across SWMU 24 (Figure 3-3). Trenches

24T1, 24T5, and 24T6 were located near the center of SWMU 24 where the majority of the waste oil handling activities occurred. Trenches 24T2, 24T3, and 24T4 were located near the edges of SWMU 24 in order to define the horizontal extent of contamination.

Field screening methods incorporated both immunoassay test and PID readings to help define the nature and extent of contamination in each trench. When visual observations and PID readings indicated that the horizontal extent of soil contamination had been reached in a trench, an immunoassay test was used to confirm that the soil was below a certain detectable contaminant concentration. Confirmation soil samples were then collected from the same location in the trench and sent to the analytical laboratory. Confirmation samples were analyzed for VOCs, PAHs, TPH, and RCRA metals. Trench geologic logs displaying immunoassay, PID, and laboratory sampling locations are shown in Figures 3-4 through 3-9. PID readings and immunoassay results are contained in Appendix H.

3.3.2.3 Groundwater Sampling

Perched groundwater seeped into Trench 24T6, and a single unfiltered groundwater sample was collected and analyzed for VOCs, PAHs, TPH, and RCRA metals. Although not specified in the Plan, the groundwater sample was collected to determine the potential impact of subsurface soil contamination on shallow, perched groundwater.

3.3.3 SWMU 24 Nature and Extent of Contamination

3.3.3.1 Surface Soil

Surface soil sample chemical results are summarized in Table 3-8. VOCs were not detected in any of the samples. Total PAH results ranged from non-detectable levels to 99.28 mg/Kg with detections in two of the eight samples. Based on potential risk to human health and the environment, the detected PAHs of potential concern are benzo(a)anthracene and benzo(b)fluoranthene. TPH (volatile) results ranged from non-detectable levels to 23.1 mg/Kg, and TPH (extractable) results ranged from 893 to 9,490 mg/Kg. In general, TPH (extractable) results tended to decrease with depth. A correlation between PAH and TPH results was not evident. RCRA metals results are summarized below:

<u>RCRA Metal</u>	<u>Detected Concentrations (mg/Kg)</u>
Arsenic	Not Detected
Barium	134 - 437
Cadmium	11 - 19.7
Chromium	84 - 232
Lead	295 - 1,140
Mercury	Not Detected - 0.202
Selenium	Not Detected
Silver	Not Detected

In general, metals concentrations decreased with depth. The highest concentrations of chromium and lead were detected within the same sample, Sample 24G1/SR1. Cadmium, chromium, and lead levels were elevated compared to typical background ranges of metals in soil given in Table 3-3. These elevated levels may be due to the presence of slag backfill rather than metals contamination associated with SWMU operations. Slag backfill was observed to depths of 10 feet in SWMU 24 trenches.

3.3.3.2 Subsurface Soil

Subsurface soil sample chemical results are summarized in Table 3-9. VOCs were not detected in any of the samples although qualifications were made during the quality control (QC) evaluation due to low surrogate recovery values. The low surrogate recovery values may be attributed to matrix interference. VOC results for one sample (Sample 24T2/SB1) were qualified as unusable, and VOC results for four samples (Samples 24T1/SB4, 24T3/SB1, 24T3/SB2, and 24T5/SB1) were qualified as estimated. Total PAH results ranged from non-detectable levels to 5.159 mg/Kg with detections in approximately 40 percent of samples. All PAH detections were in the artificial fill material except Sample 24T5/SB3. TPH (volatile) results ranged from non-detectable levels to 13.0 mg/Kg, and TPH (extractable) results ranged from non-detectable levels to 7,250 mg/Kg. The highest TPH (volatile) and TPH (extractable) results were detected in Sample 24T1/SB1 taken from near the prior location of the two waste oil ASTs. In the area of the ASTs, TPH

(extractable) results tended to decrease with depth. A correlation between PAH and TPH results was not evident. RCRA metals results are summarized below:

<u>RCRA Metal</u>	<u>Detected Concentrations (mg/Kg)</u>
Arsenic	Not Detected
Barium	20.4 - 780
Cadmium	Not Detected - 55.1
Chromium	1.31 - 3,980
Lead	Not Detected - 1,730
Mercury	Not Detected - 0.264
Selenium	Not Detected
Silver	Not Detected

Concentrations of cadmium and chromium detected in artificial fill soil samples were always higher than the concentrations detected in native soil samples. In general, concentrations of barium and lead also decreased with depth. The highest concentrations of barium, cadmium, and lead were detected within the same sample, Sample 24T5/SB1. Cadmium, chromium, and lead levels were elevated compared to typical background ranges of metals in soil shown in Table 3-3. As stated in the previous subsection, elevated metals levels may be due to the presence of slag backfill rather than metals contamination associated with SWMU operations. Slag backfill was observed to depths of 10 feet in SWMU 24 trenches.

3.3.3.3 Groundwater

Chemical results for the unfiltered groundwater sample are summarized in Table 3-10. VOCs, PAHs, and TPH (volatile) were not detected in this sample. TPH (extractable) was detected at 1.48 mg/L. Barium, cadmium, chromium, lead, and mercury were detected; however, since the groundwater sample was unfiltered, RCRA metals detections may have been affected by the groundwater's suspended soil particle content.

3.3.4 Further SWMU 24 Interim Measures Activities

The Permit requires that the following interim measures activities be completed for SWMU 24:

- Provision for proper storage and prompt disposal of waste oil.
- Clean up of oil spills and characterization, removal, and disposal of contaminated soil.

The first Permit requirement has been satisfied since waste oil is no longer managed at SWMU 24. The waste oil containers and waste oil collection system equipment have been cleaned and properly disposed of.

As stated in the Plan, the second Permit requirement of removing and disposing of soil will be fulfilled if subsurface investigation reveals a potential risk to human health and the environment. Upon evaluation of the SWMU 24 chemical analyses data, it was determined that potential risk to human health and the environment does not warrant further interim measures activities since potential receptor exposure is limited. Further interim measures activities are not proposed for SWMU 24; however, further investigation activities will be completed as part of the RFI investigation. The purpose of additional investigation activities will be to define the horizontal extent of contamination since it is anticipated that the highest levels of contamination have already been identified. An addendum to the RFI Workplan (BMWCI, 1997) detailing proposed investigation activities will be submitted within 60 days of the date of this report.

3.4 SWMU 25 - ROLL SHOP DRUM STORAGE AREA

3.4.1 SWMU 25 Description

The Roll Shop Drum Storage Area (SWMU 25), located on GST property (Figure 1-1), was used beginning in the early to mid 1970s for the storage of drums of waste oil, Swarf, worn or broken carbide tooling, spent acids, and other metal. Use of SWMU 25 for waste oil storage ended in 1993. GST continues to use the area for storage of the other materials identified above.

Releases to the environment may have occurred through leaking drums or precipitation runoff after contact with drum contents or drum lids although no documented spills are known to have occurred.

3.4.2 SWMU 25 Investigation Activities

During the subsurface investigation activities at SWMU 25, the nature and extent of contamination was assessed through the collection of surface and subsurface soil samples.

3.4.2.1 Surface Soil Sampling

Four surface soil samples were collected from the planned locations of the four soil borings described in the Plan (Figure 3-10). These soil borings were not completed in their planned locations due to the presence of subsurface utilities. Surface soil samples were collected from 0 to 12 inches bgs and were analyzed for PAHs, TPH, RCRA metals, and pH.

3.4.2.2 Subsurface Soil Sampling

During the SWMU 25 investigation, a total of eight soil borings were completed across the SWMU (Figure 3-10). Borings 25B1 through 25B4 were relocated north of their originally planned locations due to the presence of subsurface utilities. Two to three samples were collected from each soil boring depending on the auger refusal depth. The maximum depth of any soil boring was eight feet. The depth interval of each sample is shown in Table 3-12. Each subsurface soil sample was analyzed for PAHs, TPH, RCRA metals, and pH.

3.4.3 SWMU 25 Nature and Extent of Contamination

3.4.3.1 Surface Soil

Surface soil sample chemical results are summarized in Table 3-11. Total PAH results ranged from non-detectable levels to 10.101 mg/Kg with detections in two of the four samples. TPH (volatile) results ranged from an estimated concentration of 0.037 to 0.801 mg/Kg, and TPH (extractable) results ranged from 97.2 to 552 mg/Kg. A correlation between PAH and TPH results was not evident. RCRA metals results are summarized below:

<u>RCRA Metal</u>	<u>Detected Concentrations (mg/Kg)</u>
Arsenic	Not Detected
Barium	154 - 338
Cadmium	27 - 34.9
Chromium	566 - 1,070
Lead	286 - 462
Mercury	Not Detected
Selenium	Not Detected
Silver	Not Detected

The highest concentrations of cadmium and chromium were detected within the same sample, Sample 25G2/SR1. Cadmium, chromium, and lead levels were elevated compared to typical background ranges of metals in soil given in Table 3-3. These elevated levels may be due to the presence of slag backfill rather than metals contamination associated with SWMU operations. Slag backfill was confirmed at SWMU 25 to be present at depths up to eight feet (total depth of subsurface borings).

3.4.3.2 Subsurface Soil

Subsurface soil sample chemical results are summarized in Table 3-12. Total PAH results ranged from non-detectable levels to 18.271 mg/Kg with detections in approximately 85 percent of samples. TPH (volatile) results ranged from non-detectable levels to 1.08 mg/Kg, and TPH (extractable) results ranged from 22 to 1,030 mg/Kg. The highest detections of TPH (extractable) were found in the westernmost borings. A correlation between PAH and TPH results was not evident. The pH of soil samples ranged from 10.1 to 12.7. RCRA metals results are summarized below:

<u>RCRA Metal</u>	<u>Detected Concentrations (mg/Kg)</u>
Arsenic	Not Detected
Barium	209 - 636
Cadmium	21.7 - 57.9
Chromium	75 - 1,860
Lead	60.6 - 1,200
Mercury	Not Detected - 2.57
Selenium	Not Detected
Silver	Not Detected

Cadmium, chromium, lead, and mercury levels were elevated compared to typical background ranges of metals in soil given in Table 3-3. These elevated levels may be due to the presence of slag backfill rather than metals contamination associated with SWMU operations. Slag backfill was confirmed at SWMU 25 to be present at depths up to eight feet (maximum total depth of any subsurface boring).

3.4.4 Further SWMU 25 Interim Measures Activities

The Permit requires that the following interim measures activities be completed for SWMU 25:

- Provision for proper storage and prompt disposal of all waste oil.
- Clean up of oil spills and characterization, removal, and disposal of contaminated soil.

The first Permit requirement has been satisfied since waste oil is no longer managed at SWMU 25. All waste oil stored at SWMU 25 has been recycled or disposed of at an off-site facility.

As stated in the Plan, the second Permit requirement of removing and disposing of soil will be fulfilled if further subsurface investigation reveals a potential risk to human health and the environment. Upon evaluation of the SWMU 25 chemical analyses data, it was determined that

potential risk to human health and the environment does not warrant further interim measures activities since potential receptor exposure is limited. Further interim measures activities are not proposed for SWMU 25; however, further investigation activities will be completed as part of the RFI investigation. The purpose of additional investigation activities will be to further define the horizontal and vertical extent of contamination. An addendum to the RFI Workplan (BMWCI, 1997) detailing proposed investigation activities will be submitted within 60 days of the date of this report.

3.5 SWMU 26 - ROLL MILL DRUM STORAGE AREA

3.5.1 SWMU 26 Description

The Rod Mill Drum Storage Area (SWMU 26), located on GST property (Figure 1-1), was used by Armco for the storage of waste oil drums from the mid-1980s to 1993. During this period, waste oil was accumulated in the area prior to being transported to SWMU 24.

In 1994, GST constructed an extension to the Rod Mill Building which covers the area where the waste oil drums had been stored. The soil in the area was visually observed by an Armco representative during excavation activities at the time of the construction, and no signs of contamination were observed.

No documented spills are known to have occurred at this location. If a release had occurred, it would not have traveled very far across the ground surface due to the presence of a railroad spur adjacent to the SWMU.

3.5.2 SWMU 26 Investigation Activities

During the subsurface investigation activities at SWMU 26, the nature and extent of contamination was assessed through the collection of subsurface soil samples. Two soil borings were completed (Figure 3-11), and two soil samples were collected from each soil boring from two to four and four to seven feet bgs. Since excavation activities had taken place at this SWMU, the top interval of zero to two feet was not sampled. Each subsurface soil sample was analyzed for PAHs, TPH, and RCRA metals.

3.5.3 SWMU 26 Nature and Extent of Contamination

Subsurface soil sample chemical results are summarized in Table 3-13. PAHs and TPH were not detected. RCRA metals results are summarized below:

<u>RCRA Metal</u>	<u>Detected Concentrations (mg/Kg)</u>
Arsenic	Not Detected
Barium	130 - 170
Cadmium	2.85 - 3.28
Chromium	9.81 - 11.1
Lead	Not Detected
Mercury	Not Detected
Selenium	Not Detected
Silver	Not Detected

All metals levels were within typical background ranges of metals in soil given in Table 3-3.

3.5.4 Further SWMU 26 Interim Measures Activities

The Permit requires that the following interim measures activities be completed for SWMU 26:

- Provision for proper storage and prompt disposal of all waste oil.
- Clean up of oil spills and characterization, removal, and disposal of contaminated soil.

The first Permit requirement has been satisfied since waste oil is no longer managed at SWMU 26. All waste oil stored at SWMU 26 has been recycled or disposed of at an off-site facility.

The second Permit requirement is not applicable since contaminated soil was not identified at SWMU 26. An extension to the Rod Mill building was constructed over the area where drums were stored. During the construction of the extension, soil in the area was visually observed by an Armco representative to have no signs of contamination. In addition, elevated contaminant

levels were not detected during this interim measures investigation. Since elevated contaminant levels were not identified at SWMU 26, interim measures and RFI objectives have been met. No further interim measures or investigation activities are planned for SWMU 26.

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Table 3-1
SWMU 10 - Dust Railcar Loading Area - Bar Joist Building (GST)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point:		10G1/SR1	10G1/SR2	10G2/SR1	10G2/SR2	10G2/SR2D	10G3/SR1	10G3/SR2
Date Sampled:		10/29/96	10/29/96	10/29/96	10/29/96	10/29/96	10/29/96	10/29/96
Sample Depth From:		0	.5	0	.5	.5	0	.5
Sample Depth To:		.5	1	.5	1	1	.5	1
Laboratory Number:		D96-12266-1	D96-12266-3	D96-12266-10	D96-12266-11	D96-12266-12	D96-12266-13	D96-12266-16
Metals, Total	UNITS							
Cadmium, Total	mg/Kg	13 F	15.3 F	42.5 F	38.5 F	38 F	37.4 F	38.2 F
Lead, Total	mg/Kg	473	538	1,450	1,200	1,290	4,890 D	1,290

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-1
SWMU 10 - Dust Railcar Loading Area - Bar Joist Building (GST)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point:	10G4/SR1	10G4/SR2	10G5/SR1	10G5/SR2	10G6/SR1	10G6/SR2
Date Sampled:	10/29/96	10/29/96	10/29/96	10/29/96	10/29/96	10/29/96
Sample Depth From:	0	.5	0	.5	0	.5
Sample Depth To:	.5	1	.5	1	.5	1
Laboratory Number:	D96-12266-4	D96-12266-7	D96-12266-5	D96-12266-8	D96-12266-6	D96-12266-9
Metals, Total	UNITS					
Cadmium, Total	mg/Kg	24 F	21.1 F	49.3 F	24.4 F	141 F
Lead, Total	mg/Kg	1,150	930	2,030 D	1,300	5,860 D
						63.5 F
						2,870 D

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-2
SWMU 10 - Dust Railcar Loading Area - Bar Joist Building (GST)
RFI Interim Measures TCLP Testing of Select Surface Soil Samples
Armco Kansas City Facility

Sample Point:		10G3/SR1	10G6/SR1
Date Sampled:		10/29/96	10/29/96
Sample Depth From:		0	0
Sample Depth To:		.5	.5
Laboratory Number:		D96-13664-2	D96-13664-1
TCLP Metals	UNITS		
Cadmium	mg/L	0.239	0.783
Lead	mg/L	0.845	2.2

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-3
Typical Ranges of Metals in Soil
RFI Interim Measures
Armco Kansas City Facility

Parameter	Units	Dragun, 1988		EPA, 1987		Jackson and Platte Counties (Missouri)
		Range	Average	Range	Average	Range
Arsenic	mg/Kg	1.0 - 40	6	1 - 50	5	0 - 28
Barium	mg/Kg	100 - 3500	500	100 - 3000	430	700 - 1500
Cadmium	mg/Kg	0.01 - 7.0	0.06	0.01 - 0.70	0.06	0 - 1.5
Chromium	mg/Kg	5.0 - 3000	100	1 - 1000	100	70 - 85
Lead	mg/Kg	2.0 - 200	10	2 - 200	10	13 - 40
Mercury	mg/Kg	0.01 - 0.08	0.03	0.01 - 0.3	0.03	0.0 - 0.5
Selenium	mg/Kg	0.1 - 2.0	0.2	0.1 - 2.0	0.3	0.0 - 2.5
Silver	mg/Kg	0.1 - 5.0	0.1	0.01 - 5.0	0.05	n/a

Sources

- Dragun, 1988, "The Soil Chemistry of Hazardous Materials", Hazardous Materials Control Research Institute Silver Spring, Maryland, p.77.
- EPA, 1987, A Compendium of Superfund Field Operations Methods, EPA/540/PB88-181557.
- USGS, 1984, "Geography of Soil Geochemistry in Missouri Agricultural Soils", USGS Paper 954-H,I, (Jackson and Platte Counties)

Note:

n/a - Not Available

Table 3-4
SWMU 12 - Amoco Landfarm (Amoco)
Groundwater Elevations and Total Depth Measurements
RFI Interim Measures
Armco Kansas City Facility

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Groundwater Elevation (feet)	Total Depth Elevation (feet)	Saturated Well (feet)
12MW1	2/14/97	11:41	735.83	716.06	709.11	6.95
12MW2	2/14/97	11:48	735.67	713.74	707.81	5.93
12MW3	2/14/97	11:23	735.58	716.91	710.82	6.09
12MW4	2/14/97	11:35	740.90	715.91	710.51	5.40
OWA5	2/14/97	11:30	734.29	713.88	709.22	4.66
OWA6	2/14/97	11:17	734.73	717.77	710.88	6.89

Notes:

NL - No Liquid Limit
NP - No Plastic Limit
NPI - No Plasticity Index

Table 3-5
SWMU 12 - Amoco Landfarm (Amoco)
Soil Physical Properties
RFI Interim Measures
Armco Kansas City Facility

Sample Point	Sample Depth below Ground Surface (feet)	Moisture Content (%)	Atterberg Limits			Passing No. 200 Sieve (%)	Total Organic Carbon Fraction	Cation Exchange Capacity (meq/100g)	USCS Classification
			Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)				
12MW1/ST1	5 - 7	18.1	NL	NP	NPI	59.6	0.007	12.61	ML
12MW1/SS1	18 - 20	26.0	22	14	8	57.9	0.007	15.71	CL
12MW1/SS2	25 - 26	13.5	18	10	8	31.3	0.010	19.61	SC
12MW3/ST1	4 - 6	10.9	47	19	28	99.5	0.010	34.30	CL
12MW3/ST2	8 - 10	30.4	70	22	48	96.3	0.012	22.13	CH
12MW3/CS1	14 - 19	28.7	23	16	7	44.5	0.010	16.13	SC

Notes:

NL - No Liquid Limit
NP - No Plastic Limit
NPI - No Plasticity Index

Table 3-6
SWMU 12 - Amoco Landfarm (Amoco)
RFI Interim Measures Subsurface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		12MW3/CS1 12/6/96 14 19 D96-14052-3	12MW3/SS1 12/6/96 19 21 D96-14052-4	12MW4/CS1 12/6/96 7 7.5 D96-14052-1	12MW4/CS2 12/6/96 15 16 D96-14052-2
Volatiles	UNITS				
1,2-Dibromoethane	ug/Kg	13.7 U	13 U	13.2 U	13 U
1,2-Dichloroethane	ug/Kg	13.7 U	13 U	13.2 U	13 U
1,4-Dioxane	ug/Kg	13.7 U	13 U	13.2 U	13 U
2-Butanone	ug/Kg	13.7 U	13 U	13.2 U	13 U
Benzene	ug/Kg	13.7 U	13 U	13.2 U	13 U
Carbon disulfide	ug/Kg	13.7 U	13 U	13.2 U	13 U
Chlorobenzene	ug/Kg	13.7 U	13 U	13.2 U	13 U
Chloroform	ug/Kg	13.7 U	13 U	13.2 U	13 U
Ethylbenzene	ug/Kg	13.7 U	13 U	13.2 U	13 U
Styrene	ug/Kg	13.7 U	13 U	13.2 U	13 U
Toluene	ug/Kg	13.7 U	13 U	13.2 U	13 U
Xylenes (total)	ug/Kg	13.7 U	13 U	13.2 U	13 U
Total Detected VOCs	UNITS				
Total Volatiles	ug/Kg	ND	ND	ND	ND
Semivolatiles	UNITS				
2,4-Dimethylphenol	ug/Kg	907 U	857 U	868 U	856 U
2,4-Dinitrophenol	ug/Kg	4,530 U	4,290 U	4,340 U	4,280 U
4-Nitrophenol	ug/Kg	4,530 U	4,290 U	4,340 U	4,280 U
7,12-Dimethylbenz(a)anthracene	ug/Kg	907 U	857 U	868 U	856 U
Anthracene	ug/Kg	907 U	857 U	868 U	856 U
Benzo(a)anthracene	ug/Kg	907 U	857 U	868 U	856 U
Benzo(a)pyrene	ug/Kg	907 U	857 U	868 U	856 U
Benzo(b)fluoranthene	ug/Kg	907 U	857 U	868 U	856 U
Benzo(k)fluoranthene	ug/Kg	907 U	857 U	868 U	856 U
Bis(2-ethylhexyl)phthalate	ug/Kg	907 U	857 U	868 U	856 U
Butylbenzylphthalate	ug/Kg	907 U	857 U	868 U	856 U
Chrysene	ug/Kg	907 U	857 U	868 U	856 U
Di-n-butylphthalate	ug/Kg	907 U	857 U	868 U	856 U
Di-n-octylphthalate	ug/Kg	907 U	857 U	868 U	856 U
Dibenz(a,h)acridine	ug/Kg	907 U	857 U	868 U	856 U
Dibenzo(a,h)anthracene	ug/Kg	907 U	857 U	868 U	856 U
Dichlorobenzenes	ug/Kg	907 U	857 U	868 U	856 U
Diethyl phthalate	ug/Kg	907 U	857 U	868 U	856 U
Dimethyl phthalate	ug/Kg	907 U	857 U	868 U	856 U
Fluoranthene	ug/Kg	907 U	857 U	868 U	856 U
Indene	ug/Kg	907 U	857 U	868 U	856 U
Methylchrysene	ug/Kg	907 U	857 U	868 U	856 U
Methylphenols	ug/Kg	907 U	857 U	868 U	856 U
Naphthalene	ug/Kg	907 U	857 U	868 U	856 U
Phenanthrene	ug/Kg	907 U	857 U	868 U	856 U
Phenol	ug/Kg	907 U	857 U	868 U	856 U
Pyrene	ug/Kg	907 U	857 U	868 U	856 U
Pyridine	ug/Kg	907 U	857 U	868 U	856 U
Quinoline	ug/Kg	907 U	857 U	868 U	856 U
Thiophenol (Benzenethiol)	ug/Kg	907 U	857 U	868 U	856 U
Total Detected SVOCs	UNITS				
Total Semi-Volatiles	ug/Kg	ND	ND	ND	ND
Total Petroleum Hydrocarbons	UNITS				
TPH (extractable)	mg/Kg	13.7 U	14.9	13.2 U	13 U
TPH (volatile)	ug/Kg	112	92	66 U	204
Metals, Total	UNITS				
Chromium, Hexavalent	mg/Kg	0.14 U	0.13 U	0.13 U	0.13 U
Chromium, Trivalent	mg/Kg	6.92	11.2	14.7	8.64
Lead, Total	mg/Kg	18.9	18.6	26	13 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-7
SWMU 12 - Amoco Landfarm (Amoco)
RFI Interim Measures Groundwater Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Laboratory Number:		12MW1/GW1 12/11/96 D96-14212-2	12MW2/GW1 12/11/96 D96-14212-3	12MW3/GW1 12/11/96 D96-14212-4	12MW4/GW1 12/11/96 D96-14212-7	12MW4/GW1D 12/11/96 D96-14212-8
Volatiles	UNITS					
1,2-Dibromoethane	ug/L	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
1,4-Dioxane	ug/L	100 U	100 U	100 U	100 U	100 U
2-Butanone	ug/L	10 U	10 U	10 U	10 U	10 U
Benzene	ug/L	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	ug/L	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 U
Chloroform	ug/L	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	ug/L	10 U	10 U	10 U	10 U	10 U
Styrene	ug/L	10 U	10 U	10 U	10 U	10 U
Toluene	ug/L	10 U	10 U	10 U	10 U	10 U
Xylenes (total)	ug/L	10 U	10 U	10 U	10 U	10 U
Total Detected VOCs	UNITS					
Total Volatiles	ug/L	ND	ND	ND	ND	ND
Semivolatiles	UNITS					
2,4-Dimethylphenol	ug/L	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	ug/L	50 U	50 U	50 U	50 U	50 U
4-Nitrophenol	ug/L	50 U	50 U	50 U	50 U	50 U
7,12-Dimethylbenz(a)anthracene	ug/L	10 U	10 U	10 U	10 U	10 U
Anthracene	ug/L	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	ug/L	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	ug/L	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	ug/L	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	ug/L	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	ug/L	26.5	10 U	4 J	10 U	10 U
Butylbenzylphthalate	ug/L	10 U	10 U	10 U	10 U	10 U
Chrysene	ug/L	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	ug/L	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	ug/L	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)acridine	ug/L	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	ug/L	10 U	10 U	10 U	10 U	10 U
Dichlorobenzenes	ug/L	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	ug/L	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	ug/L	10 U	10 U	10 U	10 U	10 U
Fluoranthene	ug/L	10 U	10 U	10 U	10 U	10 U
Indene	ug/L	10 U	10 U	10 U	10 U	10 U
Methylchrysene	ug/L	10 U	10 U	10 U	10 U	10 U
Methylphenols	ug/L	10 U	10 U	10 U	10 U	10 U
Naphthalene	ug/L	10 U	10 U	10 U	10 U	10 U
Phenanthrene	ug/L	10 U	10 U	10 U	10 U	10 U
Phenol	ug/L	10 U	10 U	10 U	10 U	10 U
Pyrene	ug/L	10 U	10 U	10 U	10 U	10 U
Pyridine	ug/L	10 U	10 U	10 U	10 U	10 U
Quinoline	ug/L	10 U	10 U	10 U	10 U	10 U
Thiophenol (Benzenethiol)	ug/L	20 U	20 U	20 U	20 U	20 U
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	ug/L	26.5	ND	4	ND	ND
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/L	1.04	0.94	1.72	0.56	0.8
TPH (volatile)	ug/L	50 U	50 U	50 U	50 U	50 U
Metals, Dissolved	UNITS					
Chromium, Hexavalent	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium, Trivalent	mg/L	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Lead, Dissolved	mg/L	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-7
SWMU 12 - Amoco Landfarm (Amoco)
RFI Interim Measures Groundwater Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Laboratory Number:		OWA5/GW1 12/11/96 D96-14212-9		OWA6/GW1 12/11/96 D96-14212-10	
Volatiles	UNITS				
1,2-Dibromoethane	ug/L	10	U	10	U
1,2-Dichloroethane	ug/L	10	U	10	U
1,4-Dioxane	ug/L	100	U	100	U
2-Butanone	ug/L	10	U	10	U
Benzene	ug/L	10	U	10	U
Carbon disulfide	ug/L	10	U	10	U
Chlorobenzene	ug/L	10	U	10	U
Chloroform	ug/L	10	U	10	U
Ethylbenzene	ug/L	10	U	10	U
Styrene	ug/L	10	U	10	U
Toluene	ug/L	10	U	10	U
Xylenes (total)	ug/L	10	U	10	U
Total Detected VOCs	UNITS				
Total Volatiles	ug/L	ND		ND	
Semivolatiles	UNITS				
2,4-Dimethylphenol	ug/L	10	U	10	U
2,4-Dinitrophenol	ug/L	50	U	50	U
4-Nitrophenol	ug/L	50	U	50	U
7,12-Dimethylbenz(a)anthracene	ug/L	10	U	10	U
Anthracene	ug/L	10	U	10	U
Benzo(a)anthracene	ug/L	10	U	10	U
Benzo(a)pyrene	ug/L	10	U	10	U
Benzo(b)fluoranthene	ug/L	10	U	10	U
Benzo(k)fluoranthene	ug/L	10	U	10	U
Bis(2-ethylhexyl)phthalate	ug/L	10	U	10	U
Butylbenzylphthalate	ug/L	10	U	10	U
Chrysene	ug/L	10	U	10	U
Di-n-butylphthalate	ug/L	10	U	10	U
Di-n-octylphthalate	ug/L	10	U	10	U
Dibenz(a,h)acridine	ug/L	10	U	10	U
Dibenzo(a,h)anthracene	ug/L	10	U	10	U
Dichlorobenzenes	ug/L	10	U	10	U
Diethyl phthalate	ug/L	10	U	10	U
Dimethyl phthalate	ug/L	10	U	10	U
Fluoranthene	ug/L	10	U	10	U
Indene	ug/L	10	U	10	U
Methylchrysene	ug/L	10	U	10	U
Methylphenols	ug/L	10	U	10	U
Naphthalene	ug/L	10	U	10	U
Phenanthrene	ug/L	10	U	10	U
Phenol	ug/L	10	U	10	U
Pyrene	ug/L	10	U	10	U
Pyridine	ug/L	10	U	10	U
Quinoline	ug/L	10	U	10	U
Thiophenol (Benzenthionol)	ug/L	20	U	20	U
Total Detected SVOCs	UNITS				
Total Semi-Volatiles	ug/L	ND		ND	
Total Petroleum Hydrocarbons	UNITS				
TPH (extractable)	mg/L	0.5	U	0.5	U
TPH (volatile)	ug/L	50	U	50	U
Metals, Dissolved	UNITS				
Chromium, Hexavalent	mg/L	0.01	U	0.01	U
Chromium, Trivalent	mg/L	0.01	U	0.01	U
Lead, Dissolved	mg/L	0.003	U	0.003	U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-8
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24G1/SR1 10/30/96 0 .5 D96-12383-1	24G1/SR2 10/30/96 .5 1 D96-12383-2	24G1/SR2D 10/30/96 .5 1 D96-12383-3	24G2/SR1 10/30/96 0 .5 D96-12383-4	24G2/SR2 10/30/96 .5 1 D96-12383-7
Volatiles	UNITS					
1,1,1,2-Tetrachloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,1,1-Trichloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,1,2,2-Tetrachloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,1,2-Trichloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,1-Dichloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,1-Dichloroethene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,1-Dichloropropene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2,3-Trichlorobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2,3-Trichloropropane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2,4-Trichlorobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2,4-Trimethylbenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2-Dibromo-3-chloropropane	ug/Kg	30.9 U	31.4 U	30.3 U	30.8 U	30.3 U
1,2-Dibromoethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2-Dichlorobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2-Dichloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,2-Dichloropropane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,3,5-Trimethylbenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,3-Dichlorobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,3-Dichloropropane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
1,4-Dichlorobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
2,2-Dichloropropane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
2-Butanone	ug/Kg	123 U	126 U	121 U	123 U	121 U
2-Chloroethylvinyl ether	ug/Kg	12.3 U	12.6 U	12.1 U	12.3 U	12.1 U
2-Chlorotoluene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
2-Hexanone	ug/Kg	61.7 U	62.8 U	60.6 U	61.5 U	60.6 U
4-Chlorotoluene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
4-Methyl-2-pentanone	ug/Kg	123 U	126 U	121 U	123 U	121 U
Acetone	ug/Kg	123 U	126 U	121 U	123 U	121 U
Acrylonitrile	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Benzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Bromobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Bromochloromethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Bromodichloromethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Bromoform	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Bromomethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Carbon disulfide	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Carbon tetrachloride	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Chlorobenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Chloroethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Chloroform	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
cis-1,2-Dichloroethene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
cis-1,3-Dichloropropene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Dibromochloromethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Dibromomethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Ethylbenzene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Iodomethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
m,p-Xylene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Methyl chloride	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Methylene chloride	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
o-Xylene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Styrene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Tetrachloroethene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Toluene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
trans-1,2-Dichloroethene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
trans-1,3-Dichloropropene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
trans-1,4-Dichloro-2-butene	ug/Kg	123 U	126 U	121 U	123 U	121 U
Trichloroethene	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Trichlorofluoromethane	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Vinyl acetate	ug/Kg	61.7 U	62.8 U	60.6 U	61.5 U	60.6 U
Vinyl chloride	ug/Kg	6.17 U	6.28 U	6.06 U	6.15 U	6.06 U
Total Detected VOCs	UNITS					
Total Volatiles	ug/Kg	ND	ND	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-8
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24G1/SR1 10/30/96 0 .5 D96-12383-1	24G1/SR2 10/30/96 .5 1 D96-12383-2	24G1/SR2D 10/30/96 .5 1 D96-12383-3	24G2/SR1 10/30/96 0 .5 D96-12383-4	24G2/SR2 10/30/96 .5 1 D96-12383-7
Total Detected VOCs	UNITS					
- CONTINUED -						
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	4.07 U	4.15 U	2.16 J	4.06 U	4 U
Acenaphthylene	mg/Kg	4.07 U	4.15 U	4 U	4.06 U	4 U
Anthracene	mg/Kg	4.07 U	1.46 J	3.94 J	4.06 U	4 U
Benzo(a)anthracene	mg/Kg	4.07 U	3.44 J	7.13	4.06 U	4 U
Benzo(a)pyrene	mg/Kg	4.07 U	4.15 U	6.62	4.06 U	4 U
Benzo(b)fluoranthene	mg/Kg	4.07 U	4.15 U	11.4	4.06 U	4 U
Benzo(g,h,i)perylene	mg/Kg	4.07 U	4.15 U	4 U	4.06 U	4 U
Benzo(k)fluoranthene	mg/Kg	4.07 U	4.15 U	4 U	4.06 U	4 U
Chrysene	mg/Kg	4.07 U	2.99 J	8.11	4.06 U	4 U
Dibenzo(a,h)anthracene	mg/Kg	4.07 U	4.15 U	4 U	4.06 U	4 U
Fluoranthene	mg/Kg	4.07 U	5.04	14.4	4.06 U	4 U
Fluorene	mg/Kg	4.07 U	4.15 U	1.89 J	4.06 U	4 U
Indeno(1,2,3-cd)pyrene	mg/Kg	4.07 U	4.15 U	2.93 J	4.06 U	4 U
Naphthalene	mg/Kg	4.07 U	4.15 U	4 U	4.06 U	4 U
Phenanthrene	mg/Kg	4.07 U	7.74	20.6	4.06 U	4 U
Pyrene	mg/Kg	4.07 U	7.4	20.1	4.06 U	4 U
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	28.07	99.28	ND	ND
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	9,490 J*	893 J*	2,050 J*	2,900	1,180
TPH (volatile)	ug/Kg	223	142	345	100	61 U
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	12.3 U	12.6 U	12.1 U	12.3 U	12.1 U
Barium, Total	mg/Kg	437	159	188	277	153
Cadmium, Total	mg/Kg	13.6 J*	13.7 J*	15 J*	16 J*	11 J*
Chromium, Total	mg/Kg	232 J*	84 J*	134 J*	138 J*	90.2 J*
Lead, Total	mg/Kg	1,140 J*	464 J*	409 J*	416 J*	295 J*
Mercury, Total	mg/Kg	0.202	0.151 U	0.19	0.149	0.161
Selenium, Total	mg/Kg	30.9 U	31.4 U	30.3 U	30.8 U	30.3 U
Silver, Total	mg/Kg	1.23 U	1.26 U	1.21 U	1.23 U	1.21 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-8
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24G3/SR1 10/30/96 0 .5 D96-12383-8	24G3/SR2 10/30/96 .5 1 D96-12383-10	24G4/SR1 10/30/96 0 .5 D96-12383-11	24G4/SR2 10/30/96 .5 1 D96-12383-12
Volatiles	UNITS				
1,1,1,2-Tetrachloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,1,1-Trichloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,1,2,2-Tetrachloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,1,2-Trichloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,1-Dichloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,1-Dichloroethene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,1-Dichloropropene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2,3-Trichlorobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2,3-Trichloropropane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2,4-Trichlorobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2,4-Trimethylbenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2-Dibromo-3-chloropropane	ug/Kg	36.7 U	36.1 U	39 U	36.3 U
1,2-Dibromoethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2-Dichlorobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2-Dichloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,2-Dichloropropane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,3,5-Trimethylbenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,3-Dichlorobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,3-Dichloropropane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
1,4-Dichlorobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
2,2-Dichloropropane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
2-Butanone	ug/Kg	147 U	145 U	156 U	145 U
2-Chloroethylvinyl ether	ug/Kg	14.7 U	14.5 U	15.6 U	14.5 U
2-Chlorotoluene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
2-Hexanone	ug/Kg	73.4 U	72.3 U	78 U	72.7 U
4-Chlorotoluene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
4-Methyl-2-pentanone	ug/Kg	147 U	145 U	156 U	145 U
Acetone	ug/Kg	147 U	145 U	156 U	145 U
Acrylonitrile	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Benzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Bromobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Bromochloromethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Bromodichloromethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Bromoform	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Bromomethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Carbon disulfide	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Carbon tetrachloride	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Chlorobenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Chloroethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Chloroform	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
cis-1,2-Dichloroethene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
cis-1,3-Dichloropropene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Dibromochloromethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Dibromomethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Ethylbenzene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Iodomethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
m,p-Xylene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Methyl chloride	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Methylene chloride	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
o-Xylene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Styrene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Tetrachloroethene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Toluene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
trans-1,2-Dichloroethene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
trans-1,3-Dichloropropene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
trans-1,4-Dichloro-2-butene	ug/Kg	147 U	145 U	156 U	145 U
Trichloroethene	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Trichlorofluoromethane	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Vinyl acetate	ug/Kg	73.4 U	72.3 U	78 U	72.7 U
Vinyl chloride	ug/Kg	7.34 U	7.23 U	7.8 U	7.27 U
Total Detected VOCs	UNITS				
Total Volatiles	ug/Kg	ND	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-8
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24G3/SR1 10/30/96 0 .5 D96-12383-8	24G3/SR2 10/30/96 .5 1 D96-12383-10	24G4/SR1 10/30/96 0 .5 D96-12383-11	24G4/SR2 10/30/96 .5 1 D96-12383-12
Total Detected VOCs	UNITS				
- CONTINUED -					
Semivolatiles	UNITS				
Acenaphthene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Acenaphthylene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Anthracene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Benzo(a)anthracene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Benzo(a)pyrene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Benzo(b)fluoranthene	mg/Kg	14.5 U	1.13 J	1.54 U	1.44 U
Benzo(g,h,i)perylene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Benzo(k)fluoranthene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Chrysene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Dibenzo(a,h)anthracene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Fluoranthene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Fluorene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Indeno(1,2,3-cd)pyrene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Naphthalene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Phenanthrene	mg/Kg	14.5 U	1.43 U	1.54 U	1.44 U
Pyrene	mg/Kg	14.5 U	1.5 U	1.54 U	1.44 U
Total Detected SVOCs	UNITS				
Total Semi-Volatiles	mg/Kg	ND	2.63	ND	ND
Total Petroleum Hydrocarbons	UNITS				
TPH (extractable)	mg/Kg	4,830	3,970 J*	2,850 J*	1,360 J*
TPH (volatile)	ug/Kg	229	23,100 D	156	161
Metals, Total	UNITS				
Arsenic, Total	mg/Kg	14.7 U	14.5 U	15.6 U	14.5 U
Barium, Total	mg/Kg	260	220	138	134
Cadmium, Total	mg/Kg	16.3 J*	13.8 J*	19.7 J*	14.1 J*
Chromium, Total	mg/Kg	115 J*	92.8 J*	183 J*	59.2 J*
Lead, Total	mg/Kg	365 J*	376 J*	473 J*	311 J*
Mercury, Total	mg/Kg	0.176 U	0.173 U	0.187 U	0.174 U
Selenium, Total	mg/Kg	36.7 U	36.1 U	39 U	36.3 U
Silver, Total	mg/Kg	1.47 U	1.45 U	1.56 U	1.45 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinse blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T1/SB1 11/7/96 0 5 D96-12760-5	24T1/SB2 11/7/96 5 10 D96-12760-6	24T1/SB2D 11/7/96 5 10 D96-12760-7	24T1/SB3 11/7/96 10 15 D96-12760-8	24T1/SB4 11/7/96 0 5 D96-12760-9
Volatiles	UNITS					
1,1,1,2-Tetrachloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,1,1-Trichloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,1,2,2-Tetrachloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,1,2-Trichloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,1-Dichloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,1-Dichloroethene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,1-Dichloropropene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2,3-Trichlorobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2,3-Trichloropropane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2,4-Trichlorobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2,4-Trimethylbenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2-Dibromo-3-chloropropane	ug/Kg	31.4 U	29.8 U	28.7 U	30.9 U	27.6 UJ*
1,2-Dibromoethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2-Dichlorobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2-Dichloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,2-Dichloropropane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,3,5-Trimethylbenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,3-Dichlorobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,3-Dichloropropane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
1,4-Dichlorobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
2,2-Dichloropropane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
2-Butanone	ug/Kg	125 U	119 U	115 U	124 U	110 UJ*
2-Chloroethylvinyl ether	ug/Kg	12.5 U	11.9 U	11.5 U	12.4 U	11 UJ*
2-Chlorotoluene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
2-Hexanone	ug/Kg	62.7 U	59.7 U	57.5 U	61.8 U	55.2 UJ*
4-Chlorotoluene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
4-Methyl-2-pentanone	ug/Kg	125 U	119 U	115 U	124 U	110 UJ*
Acetone	ug/Kg	125 U	119 U	115 U	124 U	110 UJ*
Acrylonitrile	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Benzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Bromobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Bromochloromethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Bromodichloromethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Bromoform	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Bromomethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Carbon disulfide	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Carbon tetrachloride	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Chlorobenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Chloroethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Chloroform	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
cis-1,2-Dichloroethene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
cis-1,3-Dichloropropene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Dibromochloromethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Dibromomethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Ethylbenzene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Iodomethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
m,p-Xylene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Methyl chloride	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Methylene chloride	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
o-Xylene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Styrene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Tetrachloroethene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Toluene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
trans-1,2-Dichloroethene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
trans-1,3-Dichloropropene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
trans-1,4-Dichloro-2-butene	ug/Kg	125 U	119 U	115 U	124 U	110 UJ*
Trichloroethene	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Trichlorofluoromethane	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Vinyl acetate	ug/Kg	62.7 U	59.7 U	57.5 U	61.8 U	55.2 UJ*
Vinyl chloride	ug/Kg	6.27 U	5.97 U	5.75 U	6.18 U	5.52 UJ*
Total Detected VOCs	UNITS					
Total Volatiles	ug/Kg	ND	ND	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T1/SB1 11/7/96 0 5 D96-12760-5	24T1/SB2 11/7/96 5 10 D96-12760-6	24T1/SB2D 11/7/96 5 10 D96-12760-7	24T1/SB3 11/7/96 10 15 D96-12760-8	24T1/SB4 11/7/96 0 5 D96-12760-9
Total Detected VOCs	UNITS					
- CONTINUED -						
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.365 U
Acenaphthylene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.365 U
Anthracene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.365 U
Benzo(a)anthracene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.271 J
Benzo(a)pyrene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.376
Benzo(b)fluoranthene	mg/Kg	4.14 U	0.394 U	0.211 J	0.408 U	0.912
Benzo(g,h,i)perylene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.42
Benzo(k)fluoranthene	mg/Kg	4.14 U	0.394 U	0.221 J	0.408 U	0.482
Chrysene	mg/Kg	4.14 U	0.394 U	0.202 J	0.408 U	0.798
Dibenzo(a,h)anthracene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.365 U
Fluoranthene	mg/Kg	4.14 U	0.191 J	0.355 J	0.408 U	0.597
Fluorene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.365 U
Indeno(1,2,3-cd)pyrene	mg/Kg	4.14 U	0.394 U	0.379 U	0.408 U	0.359 J
Naphthalene	mg/Kg	4.14 U	0.394 U	0.198 J	0.408 U	0.365 U
Phenanthrene	mg/Kg	4.14 U	0.237 J	0.478	0.408 U	0.246 J
Pyrene	mg/Kg	4.14 U	0.169 J	0.315 J	0.408 U	0.698
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	0.597	1.98	ND	5.159
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	7,250	178 J*	113 J*	12.4 U	145 J*
TPH (volatile)	ug/Kg	13,000 D	159	175	32 J	74
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	12.5 U	11.9 U	11.5 U	12.4 U	11 U
Barium, Total	mg/Kg	506	331	245	137	546
Cadmium, Total	mg/Kg	40.4 F	31.1 F	22.8 F	6.5 F	49.5 F
Chromium, Total	mg/Kg	1,810 F	72.4 F	325 F	15.8 F	1,020 F
Lead, Total	mg/Kg	408 F	401 F	290 F	12.1 JF	1,480 F
Mercury, Total	mg/Kg	0.151 U	0.143 U	0.138 U	0.148 U	0.133 U
Selenium, Total	mg/Kg	31.4 U	29.8 U	28.7 U	30.9 U	27.6 U
Silver, Total	mg/Kg	1.25 U	1.19 U	1.15 U	1.24 U	1.1 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T1/SB5 11/7/96 5 10 D96-12760-10	24T1/SB6 11/7/96 10 15 D96-12760-11	24T2/SB1 11/8/96 0 5 D96-12805-1	24T2/SB2 11/8/96 5 10 D96-12805-2	24T2/SB3 11/8/96 10 15 D96-12805-3
Volatiles	UNITS					
1,1,1,2-Tetrachloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,1,1-Trichloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,1,2,2-Tetrachloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,1,2-Trichloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,1-Dichloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,1-Dichloroethene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,1-Dichloropropene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2,3-Trichlorobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2,3-Trichloropropane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2,4-Trichlorobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2,4-Trimethylbenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2-Dibromo-3-chloropropane	ug/Kg	29.6 U	32.6 U	26.9 UR	28.1 U	30.8 U
1,2-Dibromoethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2-Dichlorobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2-Dichloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,2-Dichloropropane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,3,5-Trimethylbenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,3-Dichlorobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,3-Dichloropropane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
1,4-Dichlorobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
2,2-Dichloropropane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
2-Butanone	ug/Kg	118 U	130 U	107 UR	112 U	123 U
2-Chloroethylvinyl ether	ug/Kg	11.8 U	13 U	10.7 UR	11.2 U	12.3 U
2-Chlorotoluene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
2-Hexanone	ug/Kg	59.2 U	65.1 U	53.7 UR	56.2 U	61.6 U
4-Chlorotoluene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
4-Methyl-2-pentanone	ug/Kg	118 U	130 U	107 UR	112 U	123 U
Acetone	ug/Kg	118 U	130 U	107 UR	112 U	123 U
Acrylonitrile	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Benzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Bromobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Bromochloromethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Bromodichloromethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Bromoform	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Bromomethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Carbon disulfide	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Carbon tetrachloride	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Chlorobenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Chloroethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Chloroform	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
cis-1,2-Dichloroethene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
cis-1,3-Dichloropropene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Dibromochloromethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Dibromomethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Ethylbenzene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Iodomethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
m,p-Xylene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Methyl chloride	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Methylene chloride	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
o-Xylene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Styrene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Tetrachloroethene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Toluene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
trans-1,2-Dichloroethene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
trans-1,3-Dichloropropene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
trans-1,4-Dichloro-2-butene	ug/Kg	118 U	130 U	107 UR	112 U	123 U
Trichloroethene	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Trichlorofluoromethane	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Vinyl acetate	ug/Kg	59.2 U	65.1 U	53.7 UR	56.2 U	61.6 U
Vinyl chloride	ug/Kg	5.92 U	6.51 U	5.37 UR	5.62 U	6.16 U
Total Detected VOCs	UNITS					
Total Volatiles	ug/Kg	ND	ND	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T1/SB5 11/7/96 5 10 D96-12760-10	24T1/SB6 11/7/96 10 15 D96-12760-11	24T2/SB1 11/8/96 0 5 D96-12805-1	24T2/SB2 11/8/96 5 10 D96-12805-2	24T2/SB3 11/8/96 10 15 D96-12805-3
Total Detected VOCs	UNITS					
- CONTINUED -						
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Acenaphthylene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Anthracene	mg/Kg	0.391 U	0.43 U	0.354 U	0.31 J	0.406 U
Benzo(a)anthracene	mg/Kg	0.391 U	0.43 U	0.122 J	0.209 J	0.406 U
Benzo(a)pyrene	mg/Kg	0.391 U	0.43 U	0.121 J	0.191 J	0.406 U
Benzo(b)fluoranthene	mg/Kg	0.391 U	0.43 U	0.192 J	0.272 J	0.406 U
Benzo(g,h,i)perylene	mg/Kg	0.391 U	0.43 U	0.118 J	0.371 U	0.406 U
Benzo(k)fluoranthene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Chrysene	mg/Kg	0.391 U	0.43 U	0.129 J	0.22 J	0.406 U
Dibenzo(a,h)anthracene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Fluoranthene	mg/Kg	0.391 U	0.43 U	0.354 U	0.412	0.406 U
Fluorene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Naphthalene	mg/Kg	0.391 U	0.43 U	0.354 U	0.371 U	0.406 U
Phenanthrene	mg/Kg	0.391 U	0.43 U	0.354 U	0.313 J	0.406 U
Pyrene	mg/Kg	0.391 U	0.43 U	0.354 U	0.299 J	0.406 U
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	ND	0.682	2.226	ND
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	11.8 U	13 U	10.7 U	21.2 U	12.3 U
TPH (volatile)	ug/Kg	59 U	65 U	54 U	56 U	62 U
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	11.8 U	13 U	10.7 U	11.2 U	12.3 U
Barium, Total	mg/Kg	167	179	294	128	177
Cadmium, Total	mg/Kg	5.83 F	6.33 F	32.1 FJ*	11 FJ*	5.75 FJ*
Chromium, Total	mg/Kg	30.3 F	27.7 F	3,890 F	97.6 F	15.5 F
Lead, Total	mg/Kg	33.9 F	27.6 F	15.8	158	11.6 J
Mercury, Total	mg/Kg	0.142 U	0.156 U	0.129 U	0.139	0.148 U
Selenium, Total	mg/Kg	29.6 U	32.6 U	26.9 U	28.1 U	30.8 U
Silver, Total	mg/Kg	1.18 U	1.3 U	1.07 U	1.12 U	1.23 U

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T3/SB1 11/7/96 0 5 D96-12760-2	24T3/SB2 11/7/96 5 10 D96-12760-3	24T3/SB3 11/7/96 10 15 D96-12760-4	24T4/SB1 11/8/96 0 5 D96-12805-4	24T4/SB2 11/8/96 5 10 D96-12805-5
Volatiles	UNITS					
1,1,1,2-Tetrachloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,1,1-Trichloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,1,2,2-Tetrachloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,1,2-Trichloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,1-Dichloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,1-Dichloroethene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,1-Dichloropropene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2,3-Trichlorobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2,3-Trichloropropane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2,4-Trichlorobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2,4-Trimethylbenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2-Dibromo-3-chloropropane	ug/Kg	29.5 UJ*	29 UJ*	29.3 U	29.2 U	31.7 U
1,2-Dibromoethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2-Dichlorobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2-Dichloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,2-Dichloropropane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,3,5-Trimethylbenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,3-Dichlorobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,3-Dichloropropane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
1,4-Dichlorobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
2,2-Dichloropropane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
2-Butanone	ug/Kg	118 UJ*	116 UJ*	117 U	117 U	127 U
2-Chloroethylvinyl ether	ug/Kg	11.8 UJ*	11.6 UJ*	11.7 U	11.7 U	12.7 U
2-Chlorotoluene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
2-Hexanone	ug/Kg	59 UJ*	57.9 UJ*	58.7 U	58.4 U	63.5 U
4-Chlorotoluene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
4-Methyl-2-pentanone	ug/Kg	118 UJ*	116 UJ*	117 U	117 U	127 U
Acetone	ug/Kg	118 UJ*	116 UJ*	117 U	117 U	127 U
Acrylonitrile	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Benzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Bromobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Bromochloromethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Bromodichloromethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Bromoform	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Bromomethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Carbon disulfide	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Carbon tetrachloride	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Chlorobenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Chloroethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Chloroform	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
cis-1,2-Dichloroethene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
cis-1,3-Dichloropropene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Dibromochloromethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Dibromomethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Ethylbenzene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Iodomethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
m,p-Xylene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Methyl chloride	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Methylene chloride	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
o-Xylene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Styrene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Tetrachloroethene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Toluene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
trans-1,2-Dichloroethene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
trans-1,3-Dichloropropene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
trans-1,4-Dichloro-2-butene	ug/Kg	118 UJ*	116 UJ*	117 U	117 U	127 U
Trichloroethene	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Trichlorofluoromethane	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Vinyl acetate	ug/Kg	59 UJ*	57.9 UJ*	58.7 U	58.4 U	63.5 U
Vinyl chloride	ug/Kg	5.9 UJ*	5.79 UJ*	5.87 U	5.84 U	6.35 U
Total Detected VOCs	UNITS					
Total Volatiles	ug/Kg	ND	ND	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed
F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected
J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T3/SB1 11/7/96 0 5 D96-12760-2	24T3/SB2 11/7/96 5 10 D96-12760-3	24T3/SB3 11/7/96 10 15 D96-12760-4	24T4/SB1 11/8/96 0 5 D96-12805-4	24T4/SB2 11/8/96 5 10 D96-12805-5
Total Detected VOCs	UNITS					
- CONTINUED -						
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Acenaphthylene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Anthracene	mg/Kg	0.389 U	0.382 U	0.387 U	0.328 J	0.419 U
Benzo(a)anthracene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Benzo(a)pyrene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Benzo(b)fluoranthene	mg/Kg	0.389 U	0.214 J	0.387 U	0.208 J	0.419 U
Benzo(g,h,i)perylene	mg/Kg	0.389 U	0.204 J	0.387 U	0.386 U	0.419 U
Benzo(k)fluoranthene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Chrysene	mg/Kg	0.389 U	0.321 J	0.387 U	0.207 J	0.419 U
Dibenzo(a,h)anthracene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Fluoranthene	mg/Kg	0.389 U	0.283 J	0.387 U	0.262 J	0.419 U
Fluorene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Naphthalene	mg/Kg	0.389 U	0.382 U	0.387 U	0.386 U	0.419 U
Phenanthrene	mg/Kg	0.389 U	0.462	0.387 U	0.331 J	0.419 U
Pyrene	mg/Kg	0.389 U	0.399	0.387 U	0.238 J	0.419 U
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	1.883	ND	1.574	ND
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	54.2 J*	149	11.7 U	74.4 J*	12.7 U
TPH (volatile)	ug/Kg	59 U	58 U	59 U	58 U	63 U
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	11.8 U	11.6 U	11.7 U	11.7 U	12.7 U
Barium, Total	mg/Kg	733	552	20.4	207	253
Cadmium, Total	mg/Kg	53.5 F	49.1 F	2.35 U	13.5 FJ*	8.58 FJ*
Chromium, Total	mg/Kg	1,340 F	1,070 F	1.31 JF	80.2 F	22.1 F
Lead, Total	mg/Kg	1,280 F	959 F	11.7 U	11.7 U	42.4
Mercury, Total	mg/Kg	0.142 U	0.139 U	0.141 U	0.14 U	0.152 U
Selenium, Total	mg/Kg	29.5 U	29 U	29.3 U	29.2 U	31.7 U
Silver, Total	mg/Kg	1.18 U	1.16 U	1.17 U	1.17 U	1.27 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T4/SB3 11/8/96 10 15 D96-12805-6	24T5/SB1 11/8/96 0 5 D96-12805-10	24T5/SB2 11/8/96 5 10 D96-12805-11	24T5/SB3 11/8/96 10 15 D96-12805-12	24T6/SB1 11/8/96 0 5 D96-12805-13
Volatiles	UNITS					
1,1,1,2-Tetrachloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,1,1-Trichloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,1,2,2-Tetrachloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,1,2-Trichloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,1-Dichloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,1-Dichloroethene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,1-Dichloropropene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2,3-Trichlorobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2,3-Trichloropropane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2,4-Trichlorobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2,4-Trimethylbenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2-Dibromo-3-chloropropane	ug/Kg	31.7 U	27.4 UJ*	34.8 U	31.2 U	27.3 U
1,2-Dibromoethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2-Dichlorobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2-Dichloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,2-Dichloropropane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,3,5-Trimethylbenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,3-Dichlorobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,3-Dichloropropane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
1,4-Dichlorobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
2,2-Dichloropropane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
2-Butanone	ug/Kg	127 U	110 UJ*	139 U	125 U	109 U
2-Chloroethylvinyl ether	ug/Kg	12.7 U	11 UJ*	13.9 U	12.5 U	10.9 U
2-Chlorotoluene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
2-Hexanone	ug/Kg	63.4 U	54.9 UJ*	69.6 U	62.3 U	54.6 U
4-Chlorotoluene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
4-Methyl-2-pentanone	ug/Kg	127 U	110 UJ*	139 U	125 U	109 U
Acetone	ug/Kg	127 U	110 UJ*	139 U	125 U	109 U
Acrylonitrile	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Benzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Bromobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Bromochloromethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Bromodichloromethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Bromoform	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Bromomethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Carbon disulfide	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Carbon tetrachloride	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Chlorobenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Chloroethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Chloroform	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
cis-1,2-Dichloroethene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
cis-1,3-Dichloropropene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Dibromochloromethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Dibromomethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Ethylbenzene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Iodomethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
m,p-Xylene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Methyl chloride	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Methylene chloride	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
o-Xylene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Styrene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Tetrachloroethene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Toluene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
trans-1,2-Dichloroethene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
trans-1,3-Dichloropropene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
trans-1,4-Dichloro-2-butene	ug/Kg	127 U	110 UJ*	139 U	125 U	109 U
Trichloroethene	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Trichlorofluoromethane	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Vinyl acetate	ug/Kg	63.4 U	54.9 UJ*	69.6 U	62.3 U	54.6 U
Vinyl chloride	ug/Kg	6.34 U	5.49 UJ*	6.96 U	6.23 U	5.46 U
Total Detected VOCs	UNITS					
Total Volatiles	ug/Kg	ND	ND	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T4/SB3 11/8/96 10 15 D96-12805-6	24T5/SB1 11/8/96 0 5 D96-12805-10	24T5/SB2 11/8/96 5 10 D96-12805-11	24T5/SB3 11/8/96 10 15 D96-12805-12	24T6/SB1 11/8/96 0 5 D96-12805-13
Total Detected VOCs	UNITS					
- CONTINUED -						
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Acenaphthylene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Anthracene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.31 U
Benzo(a)anthracene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Benzo(a)pyrene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Benzo(b)fluoranthene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Benzo(g,h,i)perylene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Benzo(k)fluoranthene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Chrysene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Dibenzo(a,h)anthracene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Fluoranthene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Fluorene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Naphthalene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	1.08 U
Phenanthrene	mg/Kg	0.418 U	0.362 U	1.38 U	1.23 U	0.353 J
Pyrene	mg/Kg	0.418 U	0.362 U	1.38 U	0.665 J	0.551 J
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	ND	ND	0.665	2.214
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	16.7	618	298	291	1,240 J*
TPH (volatile)	ug/Kg	63 U	29 JJ*	641	62 U	55 U
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	12.7 U	11 U	13.9 U	12.5 U	10.9 U
Barium, Total	mg/Kg	214	780	154	201	402
Cadmium, Total	mg/Kg	9.02 FJ*	55.1 FJ*	22.8 FJ*	17.3 FJ*	31.1 FJ*
Chromium, Total	mg/Kg	14.1 F	959 F	41.9 F	15.6 F	1,460 F
Lead, Total	mg/Kg	30.8	1,730	362	138	309
Mercury, Total	mg/Kg	0.152 U	0.132 U	0.226	0.264	0.152
Selenium, Total	mg/Kg	31.7 U	27.4 U	34.8 U	31.2 U	27.3 U
Silver, Total	mg/Kg	1.27 U	1.1 U	1.39 U	1.25 U	1.09 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed
F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected
J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T6/SB2 11/8/96 5 10 D96-12805-14	24T6/SB2D 11/8/96 5 10 D96-12805-15	24T6/SB3 11/8/96 10 15 D96-12805-16
Volatiles	UNITS			
1,1,1,2-Tetrachloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,1,1-Trichloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,1,2,2-Tetrachloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,1,2-Trichloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,1-Dichloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,1-Dichloroethene	ug/Kg	6.15 U	6.28 U	6.31 U
1,1-Dichloropropene	ug/Kg	6.15 U	6.28 U	6.31 U
1,2,3-Trichlorobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
1,2,3-Trichloropropane	ug/Kg	6.15 U	6.28 U	6.31 U
1,2,4-Trichlorobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
1,2,4-Trimethylbenzene	ug/Kg	6.15 U	6.28 U	6.31 U
1,2-Dibromo-3-chloropropane	ug/Kg	30.8 U	31.4 U	31.6 U
1,2-Dibromoethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,2-Dichlorobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
1,2-Dichloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
1,2-Dichloropropane	ug/Kg	6.15 U	6.28 U	6.31 U
1,3,5-Trimethylbenzene	ug/Kg	6.15 U	6.28 U	6.31 U
1,3-Dichlorobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
1,3-Dichloropropane	ug/Kg	6.15 U	6.28 U	6.31 U
1,4-Dichlorobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
2,2-Dichloropropane	ug/Kg	6.15 U	6.28 U	6.31 U
2-Butanone	ug/Kg	123 U	126 U	126 U
2-Chloroethylvinyl ether	ug/Kg	12.3 U	12.6 U	12.6 U
2-Chlorotoluene	ug/Kg	6.15 U	6.28 U	6.31 U
2-Hexanone	ug/Kg	61.5 U	62.8 U	63.1 U
4-Chlorotoluene	ug/Kg	6.15 U	6.28 U	6.31 U
4-Methyl-2-pentanone	ug/Kg	123 U	126 U	126 U
Acetone	ug/Kg	123 U	126 U	126 U
Acrylonitrile	ug/Kg	6.15 U	6.28 U	6.31 U
Benzene	ug/Kg	6.15 U	6.28 U	6.31 U
Bromobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
Bromochloromethane	ug/Kg	6.15 U	6.28 U	6.31 U
Bromodichloromethane	ug/Kg	6.15 U	6.28 U	6.31 U
Bromoform	ug/Kg	6.15 U	6.28 U	6.31 U
Bromomethane	ug/Kg	6.15 U	6.28 U	6.31 U
Carbon disulfide	ug/Kg	6.15 U	6.28 U	6.31 U
Carbon tetrachloride	ug/Kg	6.15 U	6.28 U	6.31 U
Chlorobenzene	ug/Kg	6.15 U	6.28 U	6.31 U
Chloroethane	ug/Kg	6.15 U	6.28 U	6.31 U
Chloroform	ug/Kg	6.15 U	6.28 U	6.31 U
cis-1,2-Dichloroethene	ug/Kg	6.15 U	6.28 U	6.31 U
cis-1,3-Dichloropropene	ug/Kg	6.15 U	6.28 U	6.31 U
Dibromochloromethane	ug/Kg	6.15 U	6.28 U	6.31 U
Dibromomethane	ug/Kg	6.15 U	6.28 U	6.31 U
Ethylbenzene	ug/Kg	6.15 U	6.28 U	6.31 U
Iodomethane	ug/Kg	6.15 U	6.28 U	6.31 U
m,p-Xylene	ug/Kg	6.15 U	6.28 U	6.31 U
Methyl chloride	ug/Kg	6.15 U	6.28 U	6.31 U
Methylene chloride	ug/Kg	6.15 U	6.28 U	6.31 U
o-Xylene	ug/Kg	6.15 U	6.28 U	6.31 U
Styrene	ug/Kg	6.15 U	6.28 U	6.31 U
Tetrachloroethene	ug/Kg	6.15 U	6.28 U	6.31 U
Toluene	ug/Kg	6.15 U	6.28 U	6.31 U
trans-1,2-Dichloroethene	ug/Kg	6.15 U	6.28 U	6.31 U
trans-1,3-Dichloropropene	ug/Kg	6.15 U	6.28 U	6.31 U
trans-1,4-Dichloro-2-butene	ug/Kg	123 U	126 U	126 U
Trichloroethene	ug/Kg	6.15 U	6.28 U	6.31 U
Trichlorofluoromethane	ug/Kg	6.15 U	6.28 U	6.31 U
Vinyl acetate	ug/Kg	61.5 U	62.8 U	63.1 U
Vinyl chloride	ug/Kg	6.15 U	6.28 U	6.31 U
Total Detected VOCs	UNITS			
Total Volatiles	ug/Kg	ND	ND	ND

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-9
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Subsurface Trench Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		24T6/SB2 11/8/96 5 10 D96-12805-14	24T6/SB2D 11/8/96 5 10 D96-12805-15	24T6/SB3 11/8/96 10 15 D96-12805-16
Total Detected VOCs	UNITS			
- CONTINUED -				
Semivolatiles	UNITS			
Acenaphthene	mg/Kg	0.406 U	0.415 U	0.417 U
Acenaphthylene	mg/Kg	0.406 U	0.415 U	0.417 U
Anthracene	mg/Kg	0.406 U	0.415 U	0.417 U
Benzo(a)anthracene	mg/Kg	0.406 U	0.241 J	0.417 U
Benzo(a)pyrene	mg/Kg	0.406 U	0.222 J	0.417 U
Benzo(b)fluoranthene	mg/Kg	0.406 U	0.222 J	0.417 U
Benzo(g,h,i)perylene	mg/Kg	0.406 U	0.415 U	0.417 U
Benzo(k)fluoranthene	mg/Kg	0.406 U	0.415 U	0.417 U
Chrysene	mg/Kg	0.406 U	0.294 J	0.417 U
Dibenzo(a,h)anthracene	mg/Kg	0.406 U	0.415 U	0.417 U
Fluoranthene	mg/Kg	0.406 U	0.407 J	0.417 U
Fluorene	mg/Kg	0.406 U	0.415 U	0.417 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.406 U	0.415 U	0.417 U
Naphthalene	mg/Kg	0.406 U	0.415 U	0.417 U
Phenanthrene	mg/Kg	0.253 J	0.515	0.417 U
Pyrene	mg/Kg	0.229 J	0.622	0.417 U
Total Detected SVOCs	UNITS			
Total Semi-Volatiles	mg/Kg	0.482	2.523	ND
Total Petroleum Hydrocarbons	UNITS			
TPH (extractable)	mg/Kg	60.8	67.8	12.6 U
TPH (volatile)	ug/Kg	223 J*	334 J*	45 J
Metals, Total	UNITS			
Arsenic, Total	mg/Kg	12.3 U	12.6 U	12.6 U
Barium, Total	mg/Kg	245	203	154
Cadmium, Total	mg/Kg	20.4 FJ*	18.2 FJ*	6.42 F
Chromium, Total	mg/Kg	256 F	164 F	16.2 F
Lead, Total	mg/Kg	340	245	12 J
Mercury, Total	mg/Kg	0.148 U	0.151 U	0.152 U
Selenium, Total	mg/Kg	30.8 U	31.4 U	31.6 U
Silver, Total	mg/Kg	1.23 U	1.26 U	1.26 U

LEGEND: B - Detected in the associated laboratory method blank
J* - Qualified as estimated in the QC evaluation
U - Qualified as undetected by the laboratory
NA - Not Analyzed

F - Detected in the associated equipment rinsate blank
R - Qualified as unusable in the QC evaluation
U* - Qualified as undetected in the QC evaluation
ND - Not Detected

J - Qualified as estimated by the laboratory
T - Detected in associated trip blank
D - Diluted sample

Table 3-10
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Trench Groundwater Sample
Armco Kansas City Facility

Sample Point: Date Sampled: Laboratory Number:		24T6/GW1 11/8/96 D96-12805-18	
Volatiles	UNITS		
1,1,1,2-Tetrachloroethane	ug/L	5	U
1,1,1-Trichloroethane	ug/L	5	U
1,1,2,2-Tetrachloroethane	ug/L	5	U
1,1,2-Trichloroethane	ug/L	5	U
1,1-Dichloroethane	ug/L	5	U
1,1-Dichloroethene	ug/L	5	U
1,1-Dichloropropene	ug/L	5	U
1,2,3-Trichlorobenzene	ug/L	5	U
1,2,3-Trichloropropane	ug/L	5	U
1,2,4-Trichlorobenzene	ug/L	5	U
1,2,4-Trimethylbenzene	ug/L	5	U
1,2-Dibromo-3-chloropropane	ug/L	25	U
1,2-Dibromoethane	ug/L	5	U
1,2-Dichlorobenzene	ug/L	5	U
1,2-Dichloroethane	ug/L	5	U
1,2-Dichloropropane	ug/L	5	U
1,3,5-Trimethylbenzene	ug/L	5	U
1,3-Dichlorobenzene	ug/L	5	U
1,3-Dichloropropane	ug/L	5	U
1,4-Dichlorobenzene	ug/L	5	U
2,2-Dichloropropane	ug/L	5	U
2-Butanone	ug/L	100	U
2-Chloroethylvinyl ether	ug/L	10	U
2-Chlorotoluene	ug/L	5	U
2-Hexanone	ug/L	50	U
4-Chlorotoluene	ug/L	5	U
4-Methyl-2-pentanone	ug/L	100	U
Acetone	ug/L	100	U
Acrylonitrile	ug/L	5	U
Benzene	ug/L	5	U
Bromobenzene	ug/L	5	U
Bromochloromethane	ug/L	5	U
Bromodichloromethane	ug/L	5	U
Bromoform	ug/L	5	U
Bromomethane	ug/L	5	U
Carbon disulfide	ug/L	5	U
Carbon tetrachloride	ug/L	5	U
Chlorobenzene	ug/L	5	U
Chloroethane	ug/L	5	U
Chloroform	ug/L	5	U
cis-1,2-Dichloroethene	ug/L	5	U
cis-1,3-Dichloropropene	ug/L	5	U
Dibromochloromethane	ug/L	5	U
Dibromomethane	ug/L	5	U
Ethylbenzene	ug/L	5	U
Iodomethane	ug/L	5	U
m,p-Xylene	ug/L	5	U
Methyl chloride	ug/L	5	U
Methylene chloride	ug/L	5	U
o-Xylene	ug/L	5	U
Styrene	ug/L	5	U
Tetrachloroethene	ug/L	5	U
Toluene	ug/L	5	U
trans-1,2-Dichloroethene	ug/L	5	U
trans-1,3-Dichloropropene	ug/L	5	U
trans-1,4-Dichloro-2-butene	ug/L	100	U
Trichloroethene	ug/L	5	U
Trichlorofluoromethane	ug/L	5	U
Vinyl acetate	ug/L	50	U
Vinyl chloride	ug/L	5	U
Total Detected VOCs	UNITS		
Total Volatiles	ug/L	ND	
Semivolatiles	UNITS		
Acenaphthene	ug/L	11.6	U

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-10
SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
RFI Interim Measures Trench Groundwater Sample
Armco Kansas City Facility

Sample Point: Date Sampled: Laboratory Number:		24T6/GW1 11/8/96 D96-12805-18	
Semivolatiles	UNITS		
- CONTINUED -			
Acenaphthylene	ug/L	11.6	U
Anthracene	ug/L	11.6	U
Benzo(a)anthracene	ug/L	11.6	U
Benzo(a)pyrene	ug/L	11.6	U
Benzo(b)fluoranthene	ug/L	11.6	U
Benzo(g,h,i)perylene	ug/L	11.6	U
Benzo(k)fluoranthene	ug/L	11.6	U
Chrysene	ug/L	11.6	U
Dibenzo(a,h)anthracene	ug/L	11.6	U
Fluoranthene	ug/L	11.6	U
Fluorene	ug/L	11.6	U
Indeno(1,2,3-cd)pyrene	ug/L	11.6	U
Naphthalene	ug/L	11.6	U
Phenanthrene	ug/L	11.6	U
Pyrene	ug/L	11.6	U
Total Detected SVOCs	UNITS		
Total Semi-Volatiles	ug/L	ND	
Total Petroleum Hydrocarbons	UNITS		
TPH (extractable)	mg/L	1.48	
TPH (volatile)	ug/L	50	U
Metals, Total	UNITS		
Arsenic, Total	mg/L	0.1	U
Barium, Total	mg/L	0.395	
Cadmium, Total	mg/L	0.0333	FJ*
Chromium, Total	mg/L	0.0864	F
Lead, Total	mg/L	0.768	
Mercury, Total	mg/L	0.0004	
Selenium, Total	mg/L	0.4	U
Silver, Total	mg/L	0.02	U

LEGEND: B - Detected in the associated laboratory method blank F - Detected in the associated equipment rinsate blank J - Qualified as estimated by the laboratory
J* - Qualified as estimated in the QC evaluation R - Qualified as unusable in the QC evaluation T - Detected in associated trip blank
U - Qualified as undetected by the laboratory U* - Qualified as undetected in the QC evaluation D - Diluted sample
NA - Not Analyzed ND - Not Detected

Table 3-11
SWMU 25 - Roll Shop Drum Storage Area (GST)
RFI Interim Measures Surface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		25G1/SR1 11/6/96 0 1 D96-12650-1	25G2/SR1 11/6/96 0 1 D96-12650-4	25G2/SR1D 11/6/96 0 1 D96-12650-5	25G3/SR1 11/6/96 0 1 D96-12650-6	25G4/SR1 11/6/96 0 1 D96-12650-7
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	0.367 U	0.37 U	0.368 U	0.379 U	0.372 U
Acenaphthylene	mg/Kg	0.367 U	0.37 U	0.368 U	0.379 U	0.372 U
Anthracene	mg/Kg	0.367 U	0.37 U	0.368 U	0.379 U	0.372 U
Benzo(a)anthracene	mg/Kg	0.367 U	0.37 U	0.368 U	0.832	0.372 U
Benzo(a)pyrene	mg/Kg	0.367 U	0.37 U	0.368 U	0.522	0.372 U
Benzo(b)fluoranthene	mg/Kg	0.367 U	0.37 U	0.378	1.26	0.372 U
Benzo(g,h,i)perylene	mg/Kg	0.367 U	0.37 U	0.233 J	0.661	0.372 U
Benzo(k)fluoranthene	mg/Kg	0.367 U	0.37 U	0.267 J	0.803	0.372 U
Chrysene	mg/Kg	0.367 U	0.207 J	0.219 J	1.24	0.372 U
Dibenzo(a,h)anthracene	mg/Kg	0.367 U	0.37 U	0.368 U	0.34 J	0.372 U
Fluoranthene	mg/Kg	0.367 U	0.37 U	0.19 J	1.35	0.372 U
Fluorene	mg/Kg	0.367 U	0.37 U	0.368 U	0.379 U	0.372 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.367 U	0.37 U	0.188 J	0.544	0.372 U
Naphthalene	mg/Kg	0.367 U	0.37 U	0.368 U	0.379 U	0.372 U
Phenanthrene	mg/Kg	0.367 U	0.37 U	0.368 U	0.289 J	0.372 U
Pyrene	mg/Kg	0.367 U	0.252 J	0.29 J	2.26	0.372 U
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	0.459	1.765	10.101	ND
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	552 DJ*	138 DJ*	97.2 D	156 DJ*	266 DJ*
TPH (volatile)	ug/Kg	311	111	102	801	37 J
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	11.1 U	11.2 U	11.2 U	11.5 U	11.3 U
Barium, Total	mg/Kg	308	225	282	338	154
Cadmium, Total	mg/Kg	31.9 F	34.9 F	28.2 F	27 F	27.8 F
Chromium, Total	mg/Kg	752 F	1,070 F	572 F	650 F	566 F
Lead, Total	mg/Kg	387 J*	289 J*	359 J*	462 J*	286 J*
Mercury, Total	mg/Kg	0.134 UJ*	0.134 UJ*	0.134 UJ*	0.138 UJ*	0.135 UJ*
Selenium, Total	mg/Kg	27.8 U	28 U	27.9 U	28.7 U	28.2 U
Silver, Total	mg/Kg	1.11 U	1.12 U	1.12 U	1.15 U	1.13 U
Physical Properties of Soil	UNITS					
pH	SU	8.8	8.5	8.5	10	8.2

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-12
SWMU 25 - Roll Shop Drum Storage Area (GST)
RFI Interim Measures Subsurface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		25B1/CS1 11/4/96 0 2 D96-12547-1	25B1/CS2 11/4/96 2 4 D96-12547-2	25B1/CS3 11/4/96 4 7 D96-12547-3	25B2/CS1 11/4/96 0 2 D96-12547-4	25B2/CS2 11/4/96 2 4 D96-12547-5	25B2/CS2D 11/4/96 2 4 D96-12547-6	25B2/CS3 11/4/96 4 7 D96-12547-9
Semivolatiles	UNITS							
Acenaphthene	mg/Kg	0.376 U	0.382 U	0.375 U	0.372 U	0.372 U	0.37 U	0.413 U
Acenaphthylene	mg/Kg	0.376 U	0.382 U	0.375 U	0.372 U	0.372 U	0.37 U	0.413 U
Anthracene	mg/Kg	0.376 U	0.382 U	0.375 U	0.372 U	0.372 U	0.37 U	0.413 U
Benzo(a)anthracene	mg/Kg	0.19 J	0.382 U	0.375 U	0.265 J	0.603	0.52	0.452
Benzo(a)pyrene	mg/Kg	0.221 J	0.382 U	0.375 U	0.235 J	0.546	0.611	0.507
Benzo(b)fluoranthene	mg/Kg	0.269 J	0.204 J	0.375 U	0.359 J	0.874	0.503	0.409 J
Benzo(g,h,i)perylene	mg/Kg	0.376 U	0.382 U	0.375 U	0.178 J	0.317 J	0.415	0.339 J
Benzo(k)fluoranthene	mg/Kg	0.376 U	0.382 U	0.375 U	0.332 J	0.272 J	0.604	0.413 U
Chrysene	mg/Kg	0.342 J	0.382 U	0.375 U	0.361 J	0.845	0.759	0.616
Dibenzo(a,h)anthracene	mg/Kg	0.376 U	0.382 U	0.375 U	0.372 U	0.334 J	0.325 J	0.228 J
Fluoranthene	mg/Kg	0.242 J	0.382 U	0.375 U	0.36 J	1.05	0.783	0.413 U
Fluorene	mg/Kg	0.376 U	0.382 U	0.375 U	0.372 U	0.372 U	0.37 U	0.413 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.376 U	0.382 U	0.375 U	0.153 J	0.603	0.572	0.208 J
Naphthalene	mg/Kg	0.376 U	0.382 U	0.375 U	0.372 U	0.372 U	0.37 U	0.413 U
Phenanthrene	mg/Kg	0.283 J	0.382 U	0.375 U	0.271 J	0.34 J	0.756	0.228 J
Pyrene	mg/Kg	0.343 J	0.203 J	0.375 U	0.489	1.42	1.12	0.24 J
Total Detected SVOCs	UNITS							
Total Semi-Volatiles	mg/Kg	1.89	0.407	ND	3.003	7.204	6.968	3.227
Total Petroleum Hydrocarbons	UNITS							
TPH (extractable)	mg/Kg	244 DJ*	211 DJ*	49.3	399 DJ*	442 DJ*	244 DJ*	128 J*
TPH (volatile)	ug/Kg	291 J*	276 J*	57 U	803 J*	436 J*	236 J*	63 UJ*
Metals, Total	UNITS							
Arsenic, Total	mg/Kg	11.4 U	11.6 U	11.4 U	11.3 U	11.3 U	11.2 U	12.5 U
Barium, Total	mg/Kg	413	474	512	317	350	357	256
Cadmium, Total	mg/Kg	39.9 F	57.9 F	29.9 F	39.8 F	45.6 F	41.2 F	36.9 F
Chromium, Total	mg/Kg	840	999	1,860	669	620	690	183
Lead, Total	mg/Kg	474	1,120	60.6	911	620	656	222
Mercury, Total	mg/Kg	0.137 U	0.139 U	0.136 U	0.135 U	0.135 U	0.918	0.15 U
Selenium, Total	mg/Kg	28.5 U	29 U	28.4 U	28.2 U	28.2 U	28.1 U	31.3 U
Silver, Total	mg/Kg	1.14 UJ*	1.16 UJ*	1.14 UJ*	1.13 UJ*	1.13 UJ*	1.12 UJ*	1.25 UJ*
Physical Properties of Soil	UNITS							
pH	SU	10.3	10.8	12	11.3	11.3	11.2	11

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-12
SWMU 25 - Roll Shop Drum Storage Area (GST)
RFI Interim Measures Subsurface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		25B3/CS1 11/4/96 0 2 D96-12547-10	25B3/CS2 11/4/96 2 4 D96-12547-11	25B3/CS3 11/4/96 4 7 D96-12547-12	25B4/CS1 11/4/96 0 2 D96-12547-13	25B4/CS2 11/4/96 2 4 D96-12547-14	25B4/CS3 11/4/96 4 5 D96-12547-15	25B5/CS1 11/4/96 0 2 D96-12547-16
Semivolatiles	UNITS							
Acenaphthene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Acenaphthylene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Anthracene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Benzo(a)anthracene	mg/Kg	3.67 U	0.314 J	0.254 J	0.378 U	0.374 U	0.377 U	0.371 U
Benzo(a)pyrene	mg/Kg	3.67 U	0.39 U	0.29 J	0.164 J	0.374 U	0.377 U	0.371 U
Benzo(b)fluoranthene	mg/Kg	3.67 U	0.416 U	0.299 J	0.213 J	0.374 U	0.377 U	0.204 J
Benzo(g,h,i)perylene	mg/Kg	3.67 U	0.291 J	0.419 U	0.18 J	0.374 U	0.377 U	0.371 U
Benzo(k)fluoranthene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Chrysene	mg/Kg	3.67 U	0.444 U	0.287 J	0.243 J	0.374 U	0.377 U	0.232 J
Dibenzo(a,h)anthracene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Fluoranthene	mg/Kg	3.67 U	0.556 U	0.539 U	0.228 J	0.374 U	0.207 J	0.211 J
Fluorene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Indeno(1,2,3-cd)pyrene	mg/Kg	3.67 U	0.218 J	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Naphthalene	mg/Kg	3.67 U	0.369 U	0.419 U	0.378 U	0.374 U	0.377 U	0.371 U
Phenanthrene	mg/Kg	3.67 U	0.398 U	0.499 U	0.211 J	0.374 U	0.377 U	0.229 J
Pyrene	mg/Kg	3.67 U	0.498 U	0.432 U	0.279 J	0.374 U	0.377 U	0.183 J
Total Detected SVOCs	UNITS							
Total Semi-Volatiles	mg/Kg	ND	3.525	2.6	1.518	ND	0.207	1.059
Total Petroleum Hydrocarbons	UNITS							
TPH (extractable)	mg/Kg	22 J*	94.6 J*	140 D	730 J*	95.7 J*	1,030 DJ*	441 D
TPH (volatile)	ug/Kg	659 J*	199 J*	64 U	196 J*	65 J*	697 J*	636 J*
Metals, Total	UNITS							
Arsenic, Total	mg/Kg	11.1 U	11.2 U	12.7 U	11.4 U	11.3 U	11.4 U	11.2 U
Barium, Total	mg/Kg	209	365	212	377	418	414	416
Cadmium, Total	mg/Kg	21.7 F	35.4 F	23.6 F	30.7 F	33.4 F	49 F	46.2 F
Chromium, Total	mg/Kg	386	767	75	948	709	1,150	709
Lead, Total	mg/Kg	415	612	107	368	526	454	1,200
Mercury, Total	mg/Kg	0.134 U	0.134 U	0.152 U	0.137 U	0.136 U	2.57	0.135 U
Selenium, Total	mg/Kg	27.8 U	27.9 U	31.8 U	28.6 U	28.3 U	28.5 U	28.1 U
Silver, Total	mg/Kg	1.11 UJ*	1.12 UJ*	1.27 UJ*	1.14 UJ*	1.13 UJ*	1.14 UJ*	1.12 UJ*
Physical Properties of Soil	UNITS							
pH	SU	10.4	10.7	11.5	10.8	11	11.4	11

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-12
SWMU 25 - Roll Shop Drum Storage Area (GST)
RFI Interim Measures Subsurface Soil Samples
Armco Kansas City Facility

Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		25B5/CS2 11/4/96 2 4 D96-12547-17	25B6/CS1 11/4/96 0 2 D96-12547-18	25B6/CS2 11/4/96 2 4 D96-12547-19	25B7/CS1 11/4/96 0 2 D96-12547-20	25B7/CS2 11/4/96 2 4 D96-12547-21	25B7/CS3 11/4/96 4 5.5 D96-12547-22	25B8/CS1 11/4/96 0 2 D96-12547-24
Semivolatiles	UNITS							
Acenaphthene	mg/Kg	0.362 U	0.365 U	0.368 U	0.371 U	0.388 U	0.21 J	0.367 U
Acenaphthylene	mg/Kg	0.362 U	0.365 U	0.368 U	0.371 U	0.388 U	0.381 U	0.367 U
Anthracene	mg/Kg	0.362 U	0.365 U	0.368 U	0.371 U	0.388 U	0.399	0.367 U
Benzo(a)anthracene	mg/Kg	0.362 U	0.365 U	0.532	0.371 U	0.186 J	1.37	0.367 U
Benzo(a)pyrene	mg/Kg	0.362 U	0.365 U	0.622	0.371 U	0.183 J	1.73	0.367 U
Benzo(b)fluoranthene	mg/Kg	0.225 J	0.365 U	0.542	0.371 U	0.289 J	2.19	0.233 J
Benzo(g,h,i)perylene	mg/Kg	0.362 U	0.365 U	0.771	0.272 J	0.165 J	0.97	0.158 J
Benzo(k)fluoranthene	mg/Kg	0.362 U	0.365 U	0.772	0.371 U	0.388 U	0.725	0.367 U
Chrysene	mg/Kg	0.237 J	0.365 U	0.768	0.216 J	0.415	1.63	0.246 J
Dibenzo(a,h)anthracene	mg/Kg	0.362 U	0.365 U	0.467	0.371 U	0.388 U	0.457	0.367 U
Fluoranthene	mg/Kg	0.297 J	0.365 U	0.518	0.133 J	0.172 J	2.21	0.198 J
Fluorene	mg/Kg	0.362 U	0.365 U	0.368 U	0.371 U	0.388 U	0.221 J	0.367 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.362 U	0.365 U	0.381	0.371 U	0.388 U	0.735	0.367 U
Naphthalene	mg/Kg	0.362 U	0.365 U	0.266 J	0.371 U	0.388 U	0.724	0.367 U
Phenanthrene	mg/Kg	0.198 J	0.128 J	0.46	0.179 J	0.389	1.76	0.367 U
Pyrene	mg/Kg	0.185 J	0.231 J	1.53	0.403	0.322 J	2.94	0.237 J
Total Detected SVOCs	UNITS							
Total Semi-Volatiles	mg/Kg	1.142	0.359	7.629	1.203	2.121	18.271	1.072
Total Petroleum Hydrocarbons	UNITS							
TPH (extractable)	mg/Kg	257 J*	202 DJ*	237 DJ*	208 DJ*	72.9 J*	803 DJ*	187 DJ*
TPH (volatile)	ug/Kg	332 J*	264 J*	393 J*	367 J*	1,080 J*	408 J*	420 J*
Metals, Total	UNITS							
Arsenic, Total	mg/Kg	11 U	11.1 U	11.2 U	11.2 U	11.8 U	11.5 U	11.1 U
Barium, Total	mg/Kg	312	291	375	368	636	227	381
Cadmium, Total	mg/Kg	53 F	22.3 F	28.2 F	27.4 F	28.2 F	45.1 F	40.5 F
Chromium, Total	mg/Kg	923	498	579	580	968	369	496
Lead, Total	mg/Kg	593	352	532	487	385	527	722
Mercury, Total	mg/Kg	0.132 U	0.133 U	0.134 U	0.135 U	0.141 U	0.785	0.134 U
Selenium, Total	mg/Kg	27.4 U	27.7 U	27.9 U	28.1 U	29.4 U	28.8 U	27.8 U
Silver, Total	mg/Kg	1.1 UJ*	1.11 U	1.12 U	1.12 U	1.18 U	1.15 U	1.11 U
Physical Properties of Soil	UNITS							
pH	SU	11.1	10.2	10.1	10.2	10.8	10.6	11

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-12
SWMU 25 - Roll Shop Drum Storage Area (GST)
RFI Interim Measures Subsurface Soil Samples
Armco Kansas City Facility

Sample Point:		25B8/CS2	25B8/CS3
Date Sampled:		11/4/96	11/4/96
Sample Depth From:		2	4
Sample Depth To:		4	8
Laboratory Number:		D96-12547-25	D96-12547-26
Semivolatiles	UNITS		
Acenaphthene	mg/Kg	0.395 U	0.404 U
Acenaphthylene	mg/Kg	0.395 U	0.404 U
Anthracene	mg/Kg	0.395 U	0.404 U
Benzo(a)anthracene	mg/Kg	0.292 J	0.442
Benzo(a)pyrene	mg/Kg	0.395 U	0.511
Benzo(b)fluoranthene	mg/Kg	0.37 J	0.741
Benzo(g,h,i)perylene	mg/Kg	0.2 J	0.328 J
Benzo(k)fluoranthene	mg/Kg	0.395 U	0.267 J
Chrysene	mg/Kg	0.787	0.703
Dibenzo(a,h)anthracene	mg/Kg	0.395 U	0.404 U
Fluoranthene	mg/Kg	0.333 J	0.699
Fluorene	mg/Kg	0.395 U	0.404 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.395 U	0.256 J
Naphthalene	mg/Kg	0.395 U	0.536
Phenanthrene	mg/Kg	0.676	0.904
Pyrene	mg/Kg	0.603	0.935
Total Detected SVOCs	UNITS		
Total Semi-Volatiles	mg/Kg	3.261	6.322
Total Petroleum Hydrocarbons	UNITS		
TPH (extractable)	mg/Kg	141 J*	321 DJ*
TPH (volatile)	ug/Kg	451 J*	901 J*
Metals, Total	UNITS		
Arsenic, Total	mg/Kg	12 U	12.3 U
Barium, Total	mg/Kg	440	212
Cadmium, Total	mg/Kg	22.3 F	33.9 F
Chromium, Total	mg/Kg	1,030	334
Lead, Total	mg/Kg	213	454
Mercury, Total	mg/Kg	0.144 U	0.173
Selenium, Total	mg/Kg	29.9 U	30.6 U
Silver, Total	mg/Kg	1.2 U	1.23 U
Physical Properties of Soil	UNITS		
pH	SU	12.7	11.3

LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation

Table 3-13
SWMU 26 - Rod Mill Drum Storage Area (GST)
RFI Interim Measures Subsurface Soil Samples
Armco Kansas City Facility

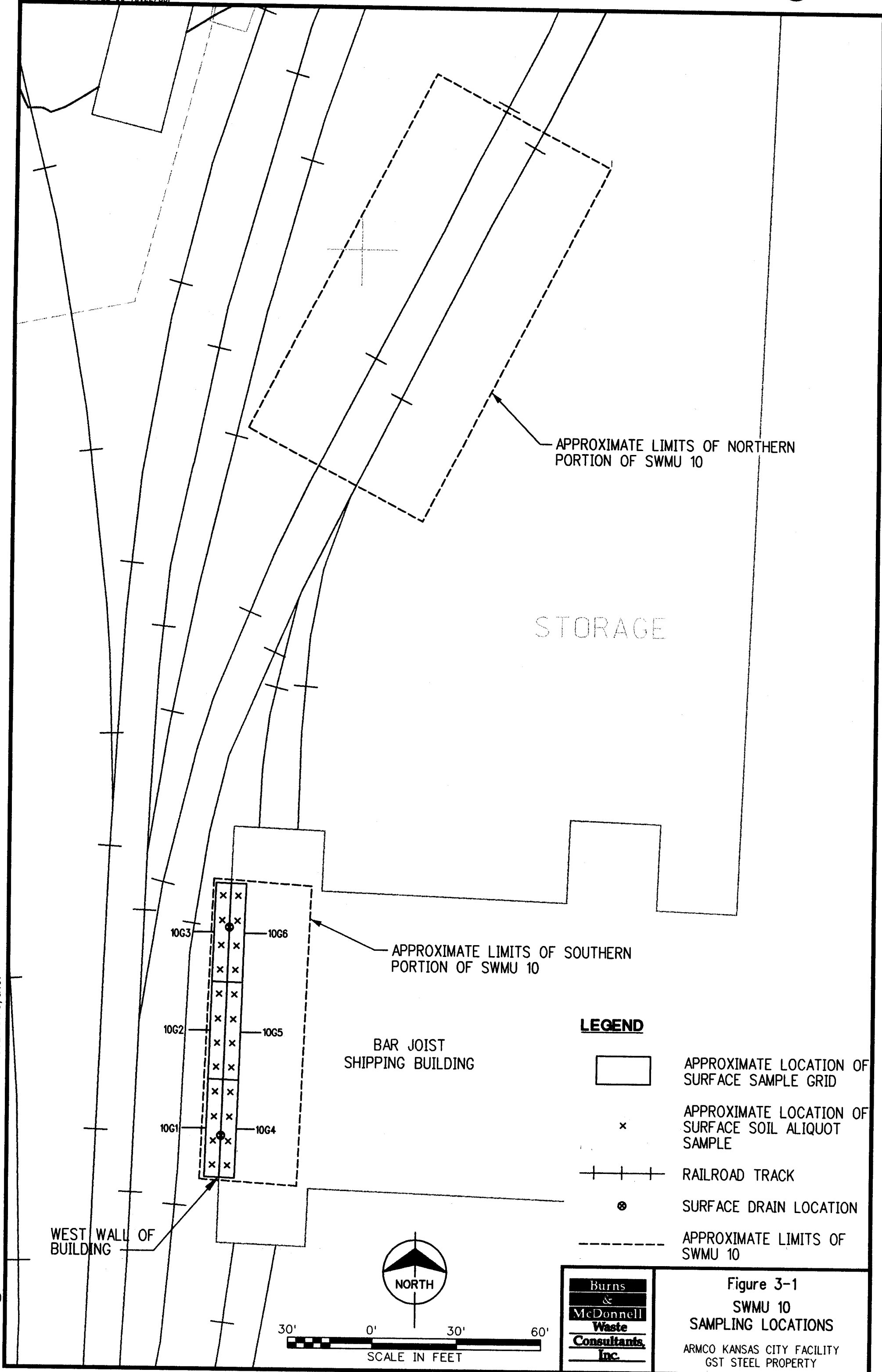
Sample Point: Date Sampled: Sample Depth From: Sample Depth To: Laboratory Number:		26B1/CS1 11/4/96 2 4 D96-12547-27	26B1/CS2 11/4/96 4 7 D96-12547-28	26B2/CS1 11/4/96 2 4 D96-12547-31	26B2/CS1D 11/4/96 2 4 D96-12547-32	26B2/CS2 11/4/96 4 7 D96-12547-33
Semivolatiles	UNITS					
Acenaphthene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Acenaphthylene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Anthracene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Benzo(a)anthracene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Benzo(a)pyrene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Benzo(b)fluoranthene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Benzo(g,h,i)perylene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Benzo(k)fluoranthene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Chrysene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Dibenzo(a,h)anthracene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Fluoranthene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Fluorene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Indeno(1,2,3-cd)pyrene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Naphthalene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Phenanthrene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Pyrene	mg/Kg	0.406 U	0.435 U	0.397 U	0.43 U	0.426 U
Total Detected SVOCs	UNITS					
Total Semi-Volatiles	mg/Kg	ND	ND	ND	ND	ND
Total Petroleum Hydrocarbons	UNITS					
TPH (extractable)	mg/Kg	12.3 U	13.2 U	12 U	13 U	12.9 U
TPH (volatile)	ug/Kg	62 U	66 U	60 U	65 U	65 U
Metals, Total	UNITS					
Arsenic, Total	mg/Kg	12.3 U	13.2 U	12 U	13 U	12.9 U
Barium, Total	mg/Kg	155	145	130	170	140
Cadmium, Total	mg/Kg	2.85 F	3.13 F	2.98 F	3.21 F	3.28 F
Chromium, Total	mg/Kg	9.81	11.1	10.6	11	10.9
Lead, Total	mg/Kg	12.3 U	13.2 U	12 U	13 U	12.9 U
Mercury, Total	mg/Kg	0.148 U	0.158 U	0.144 U	0.156 U	0.155 U
Selenium, Total	mg/Kg	30.8 U	33 U	30 U	32.6 U	32.3 U
Silver, Total	mg/Kg	1.23 U	1.32 U	0.78 J	1.3 U	1.29 U

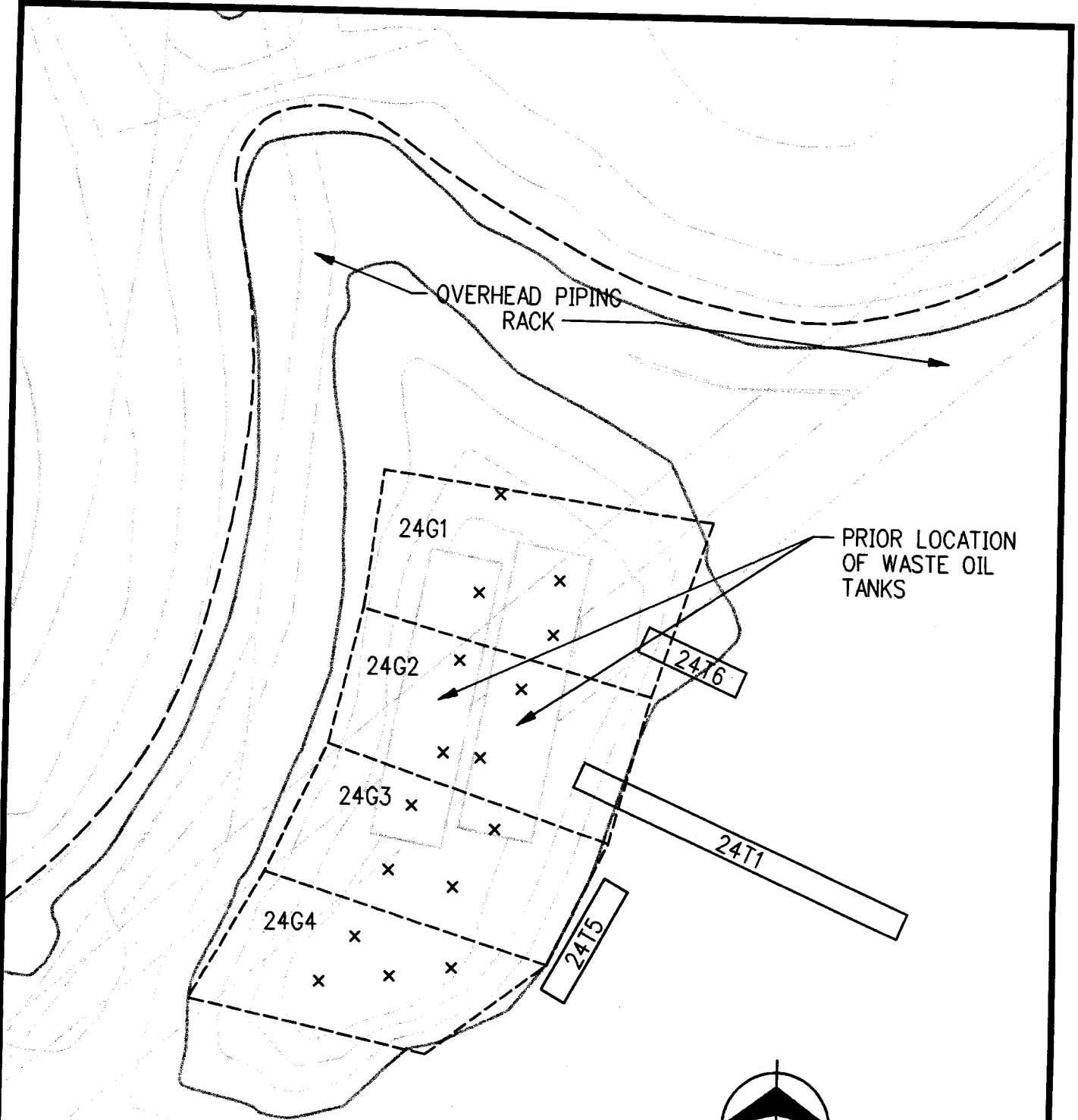
LEGEND: B - Detected in the associated laboratory method blank
R - Qualified as unusable in the QC evaluation
D - Diluted sample

F - Detected in the associated equipment rinsate blank
T - Detected in associated trip blank
NA - Not Analyzed

J - Qualified as estimated by the laboratory
U - Qualified as undetected by the laboratory
ND - Not Detected

J* - Qualified as estimated in the QC evaluation
U* - Qualified as undetected in the QC evaluation





LEGEND

24T5

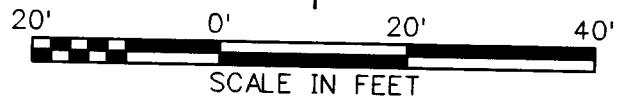
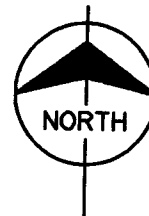
TRENCH LOCATION

APPROXIMATE LOCATION OF
SURFACE SAMPLE GRID

x

APPROXIMATE LOCATION OF
SURFACE SOIL ALIQUOT
SAMPLE

APPROXIMATE LIMITS
OF SWMU 24



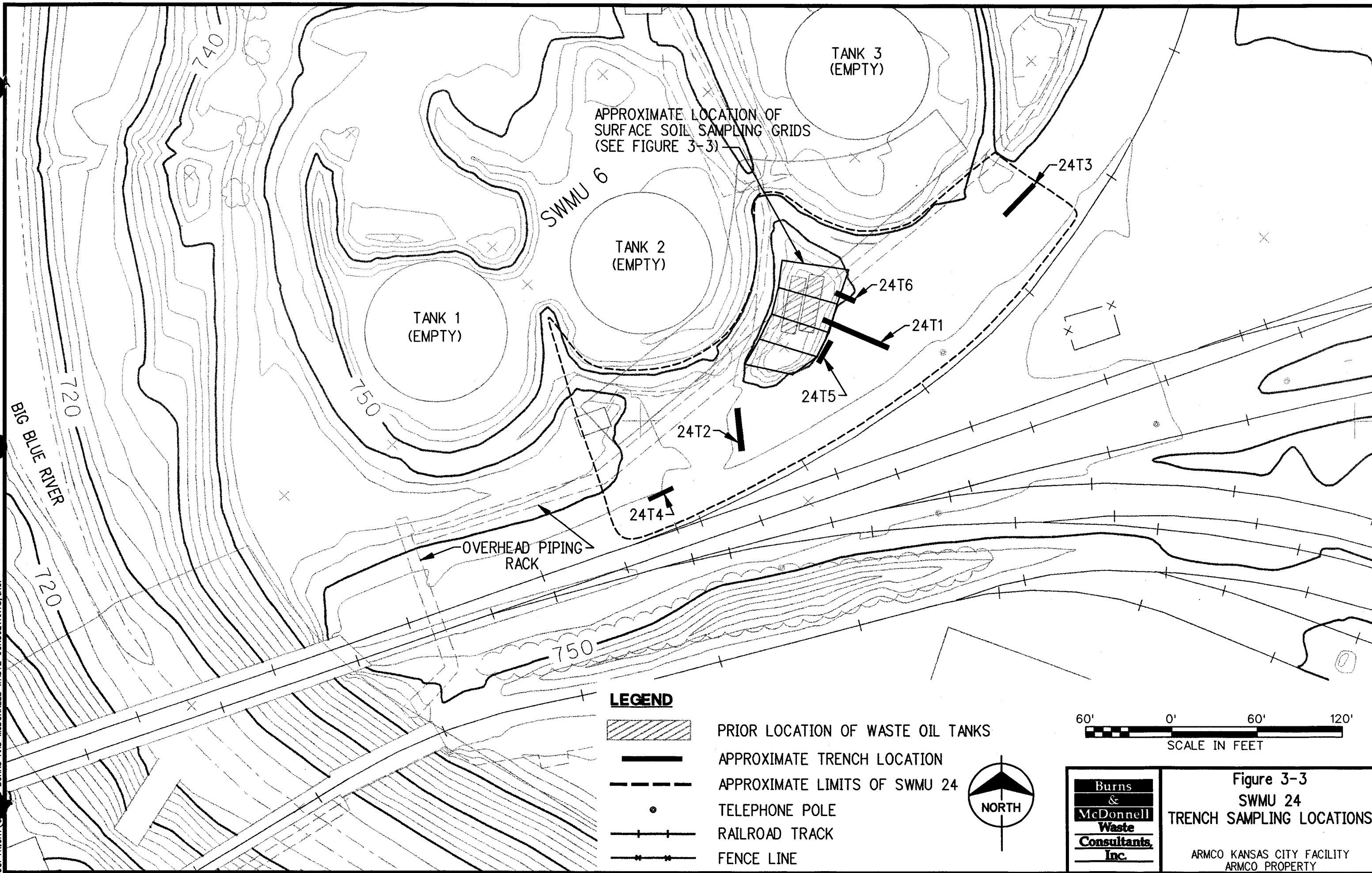
**Burns
&
McDonnell
Waste
Consultants
Inc.**

Figure 3-2
SWMU 24
SAMPLING LOCATIONS
 ARMCO KANSAS CITY FACILITY
 ARMCO PROPERTY

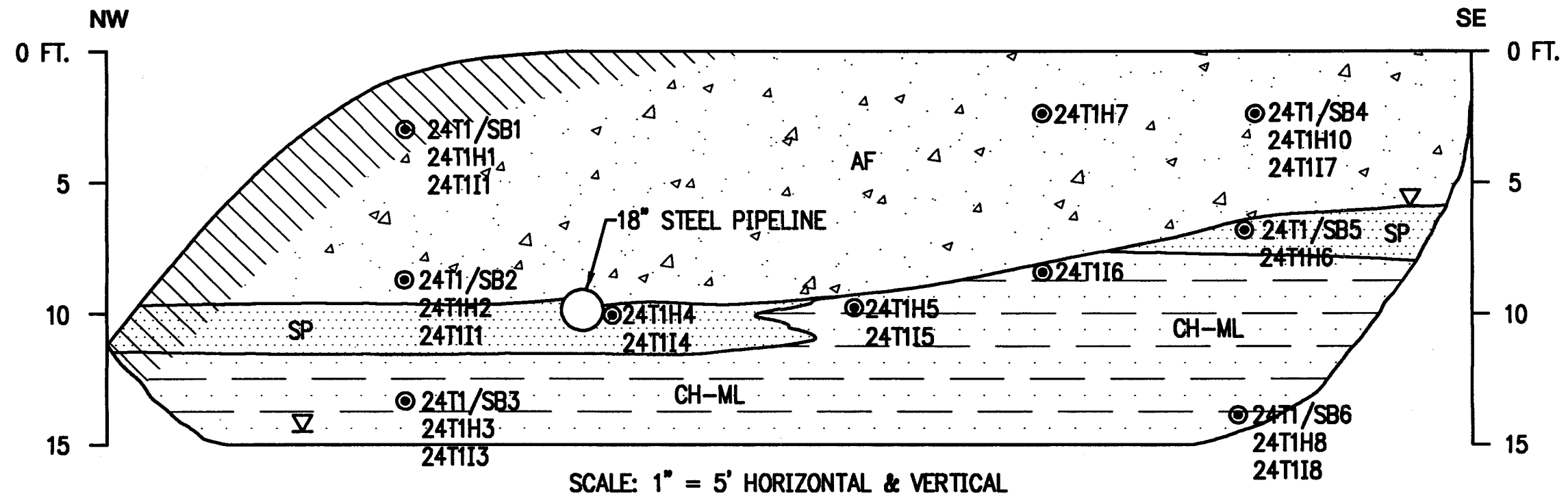
SYNOPSIS OF WORK
COMB. ARMCOB. DGN. OF 2-2-63

SWMUG18.DGN
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BURNS AND MCDONNELL WASTE CONSULTANTS, INC.

DATE: FEB-96 11:35/BDP



TRENCH 24T1



LEGEND



VISIBLY CONTAMINATED MATERIAL

- 24T1/SB1
- 24T1H1
- 24T1I1

LAB ANALYSIS SOIL SAMPLE LOCATION
HEADSPACE SOIL SAMPLE LOCATION
IMMUNOASSAY SOIL SAMPLE LOCATION



PERCHED GROUNDWATER

AF

ARTIFICIAL FILL; SLAG & REFRACTORY BRICK RUBBLE IN SAND/GRAVEL SLAG MATRIX, VERY DARK BROWN (10YR 2/2)

SP

POORLY GRADED MEDIUM TO COARSE SAND, GRAYISH BROWN (10YR 5/2)

CH-ML

VERY DARK GRAYISH BROWN (10YR 3/2) CLAY AND SILT, MOIST, PLASTIC

LOGGED BY: KEN SIMMONS
REYNOLD TOMES
11/7/96

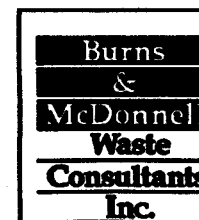
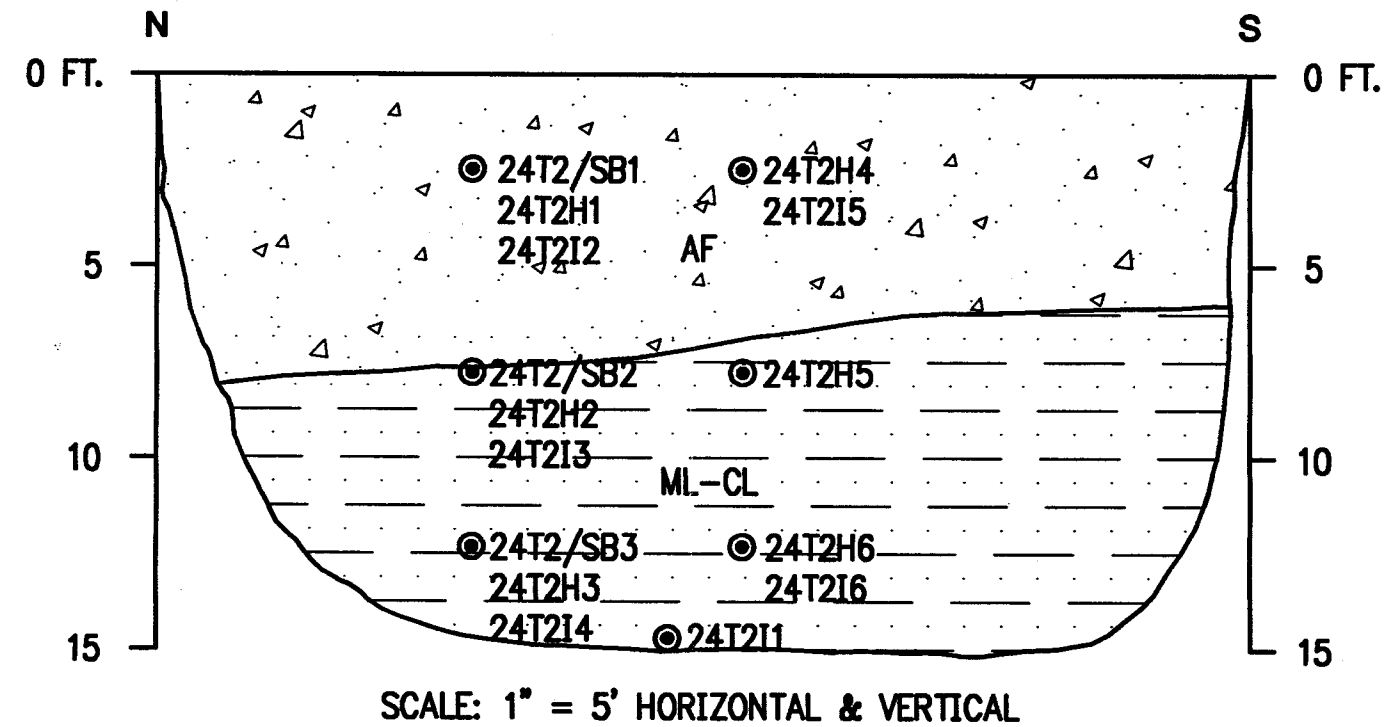


Figure 3-4
SWMU 24
TRENCH 24T1 LOG
ARMCO KANSAS CITY FACILITY
ARMCO PROPERTY

TRENCH 24T2



LEGEND

- 24T2/SB1 LAB ANALYSIS SOIL SAMPLE LOCATION
- 24T2H1 HEADSPACE SOIL SAMPLE LOCATION
- 24T2I1 IMMUNOASSAY SOIL SAMPLE LOCATION
- AF ARTIFICIAL FILL; SLAG & REFRACTORY BRICK RUBBLE IN SAND/GRAVEL SLAG MATRIX, VERY DARK BROWN (10YR 2/2)
- ML-CL DARK GRAYISH BROWN (10YR 4/2) SILT WITH SOME CLAY, LOW PLASTICITY

LOGGED BY: KEN SIMMONS
REYNOLD TOMES
11/8/96

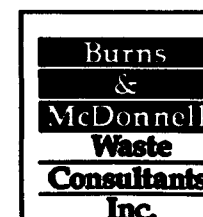
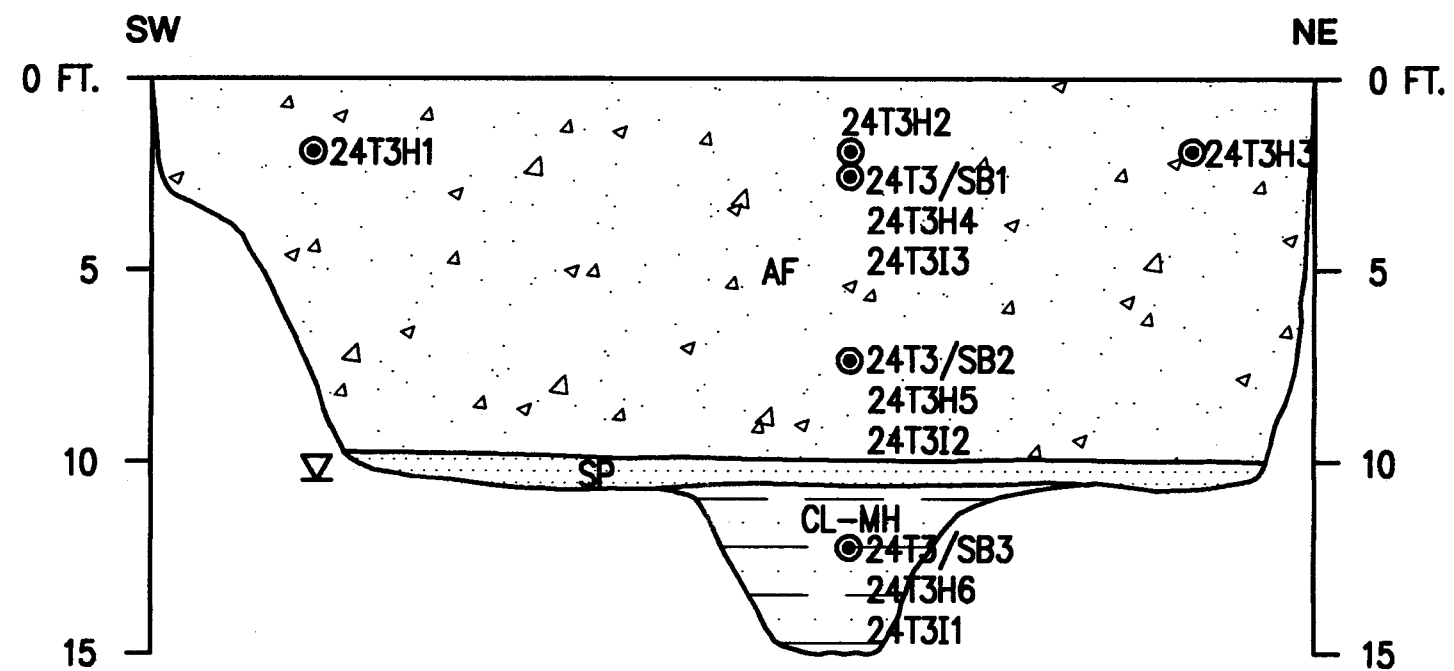


Figure 3-5
SWMU 24
TRENCH 24T2 LOG
ARMCO KANSAS CITY FACILITY
ARMCO PROPERTY

TRENCH 24T3



SCALE: 1" = 5' HORIZONTAL & VERTICAL

LEGEND

- 24T3/SB1 LAB ANALYSIS SOIL SAMPLE LOCATION
- 24T3H1 HEADSPACE SOIL SAMPLE LOCATION
- 24T3I1 IMMUNOASSAY SOIL SAMPLE LOCATION
- ∇ PERCHED GROUNDWATER
- AF ARTIFICIAL FILL; SLAG & REFRACTORY BRICK RUBBLE IN SAND/GRAVEL SLAG MATRIX, VERY DARK GRAY (10YR 3/1) TO VERY DARK BROWN (10YR 2/2)
- SP POORLY GRADED, MEDIUM TO COARSE SAND, OLIVE GRAY (5YR 5/2) TO BLACK (5YR 2.5/1) DUE TO ORGANICS
- CL-MH CLAY AND SILT

LOGGED BY: KEN SIMMONS
REYNOLD TOMES
11/5/96

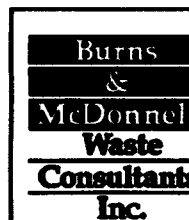
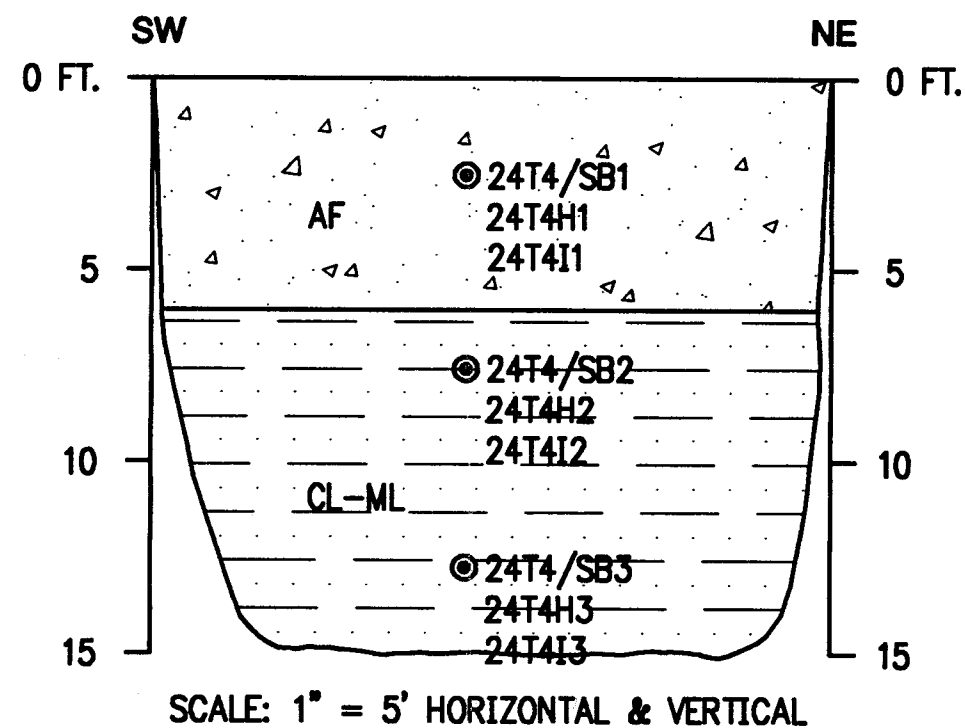


Figure 3-6
SWMU 24
TRENCH 24T3 LOG
ARMCO KANSAS CITY FACILITY
ARMCO PROPERTY

TRENCH 24T4



LEGEND

- 24T4/SB1 LAB ANALYSIS SOIL SAMPLE LOCATION
- 24T4H1 HEADSPACE SOIL SAMPLE LOCATION
- 24T4I1 IMMUNOASSAY SOIL SAMPLE LOCATION
- AF ARTIFICIAL FILL; SLAG AND REFRACTORY BRICK, WOOD, & METAL RUBBLE IN SAND/GRAVEL MATRIX; VERY DARK BROWN
- CL-ML DARK GRAYISH BROWN (10YR 4/2), STIFF, MOIST, LOW PLASTICITY

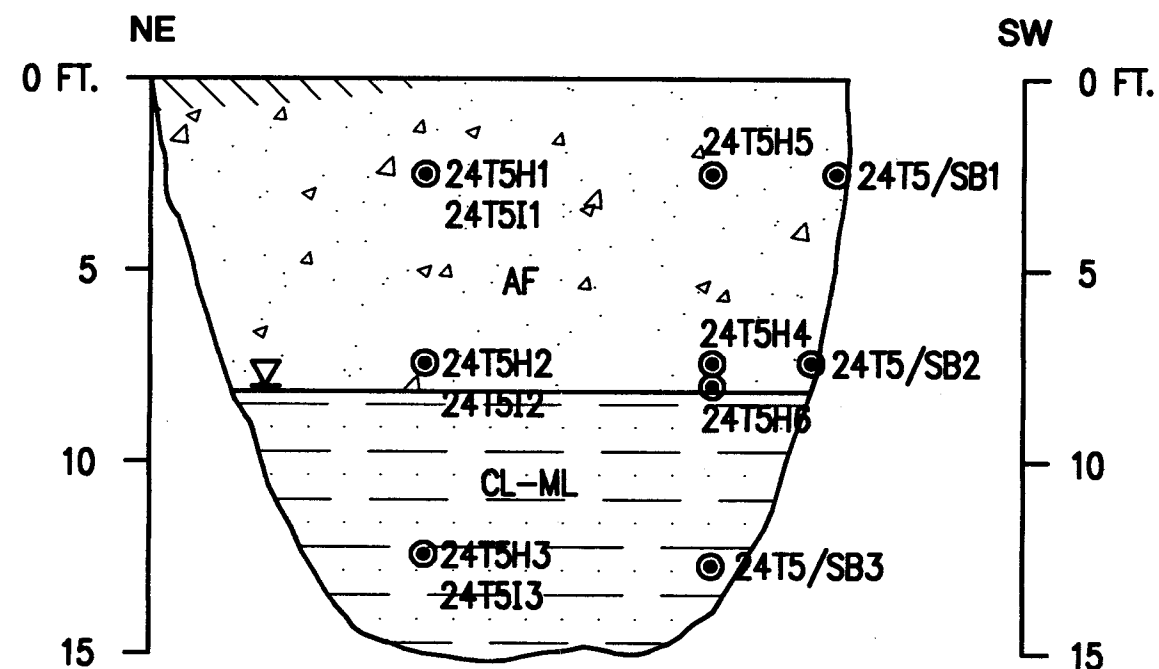
LOGGED BY: KEN SIMMONS
REYNOLD TOMES
11/8/96

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Figure 3-7
SWMU 24
TRENCH 24T4 LOG


ARMCO KANSAS CITY FACILITY
ARMCO PROPERTY

TRENCH 24T5



SCALE: 1" = 5' HORIZONTAL & VERTICAL

LEGEND

-  VISIBLY CONTAMINATED MATERIAL
- 24T5/SB1 LAB ANALYSIS SOIL SAMPLE LOCATION
- 24T5H1 HEADSPACE SOIL SAMPLE LOCATION
- 24T5I1 IMMUNOASSAY SOIL SAMPLE LOCATION
- ▽ PERCHED GROUNDWATER
- AF ARTIFICIAL FILL; SLAG & REFRACTORY BRICK RUBBLE IN SAND/GRAVEL MATRIX, VERY DARK BROWN (10YR 2/2)
- CL-ML DARK GRAYISH BROWN (10YR 4/2) CLAY & SILT, MOIST TO WET, THIN LAYER OF CINDERS AT CONTACT

LOGGED BY: KEN SIMMONS
11/8/96

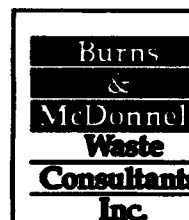
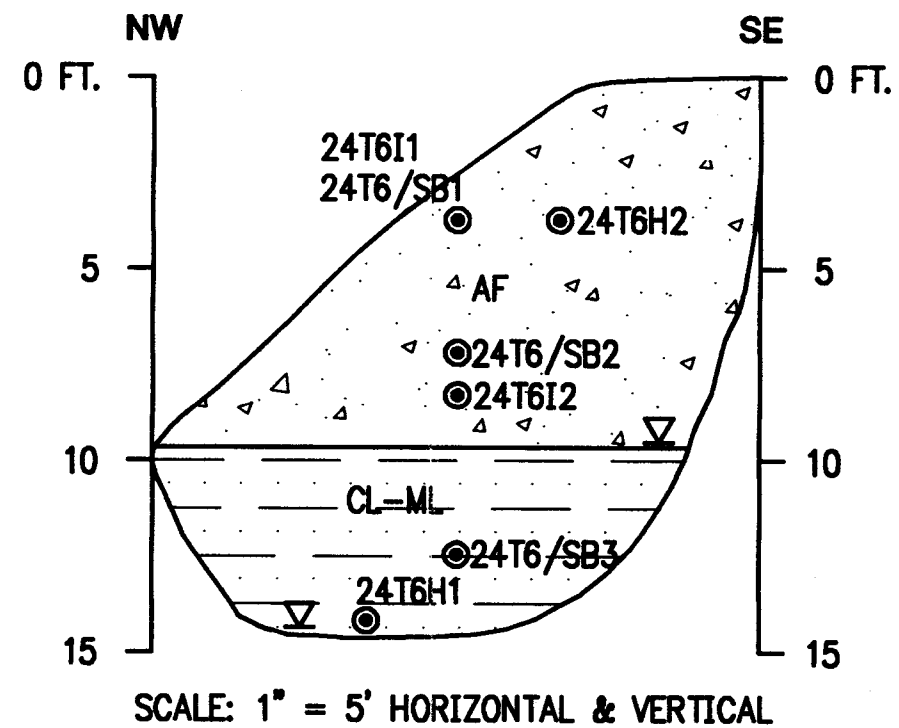


Figure 3-8
SWMU 24
TRENCH 24T5 LOG

ARMCO KANSAS CITY FACILITY
ARMCO PROPERTY

TRENCH 24T6



LEGEND

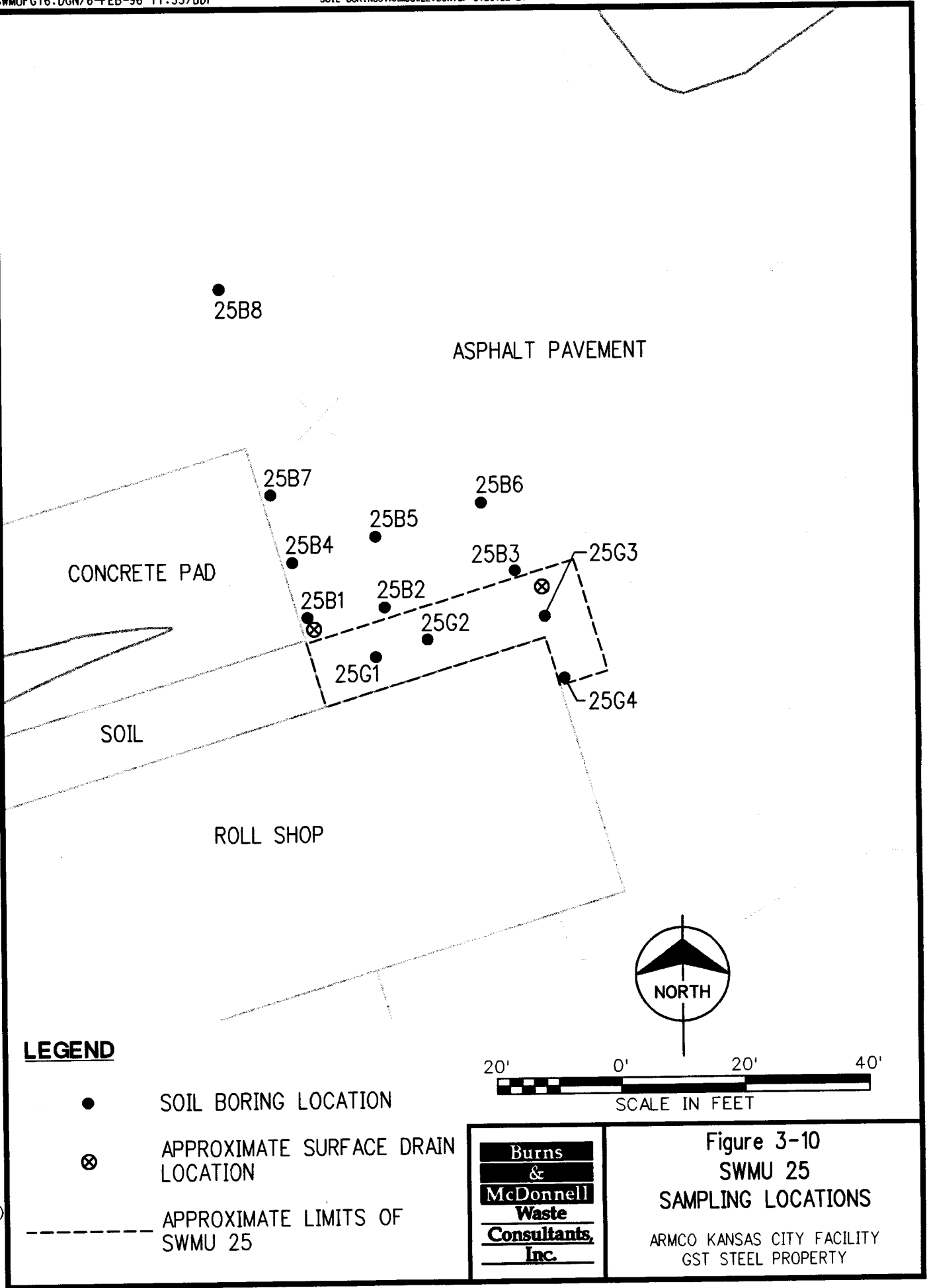
- ⊙ 24T6/SB1 LAB ANALYSIS SOIL SAMPLE LOCATION
- ⊙ 24T6H1 HEADSPACE SOIL SAMPLE LOCATION
- ⊙ 24T6I1 IMMUNOASSAY SOIL SAMPLE LOCATION
- ▽ PERCHED GROUNDWATER
- AF ARTIFICIAL FILL; SLAG & REFRACTORY BRICK RUBBLE IN VERY DARK BROWN (10YR 2/2) SAND/GRAVEL MATRIX
- CL-ML CLAY WITH SILT; THIN CINDER LAYER AT CONTACT WITH SLAG

LOGGED BY: KEN SIMMONS
11/8/96

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Figure 3-9
SWMU 24
TRENCH 24T6 LOG
ARMCO KANSAS CITY FACILITY
ARMCO PROPERTY

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ROD MILL
BUILDING

BUILDING
EXTENSION

CONCRETE PAD

26B1

26B2

AIR COMPRESSOR
BUILDING

LEGEND

- SOIL BORING LOCATION
- APPROXIMATE LIMITS OF SWMU 26
- + + RAILROAD TRACK
- x x FENCE LINE



20' 0' 20' 40'
SCALE IN FEET

Burns
&
McDonnell
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Figure 3-11
SWMU 26
SAMPLING LOCATIONS
ARMCO KANSAS CITY FACILITY
GST STEEL PROPERTY

4.0 CONCLUSIONS

The overall objectives of the interim measures investigation were to collect data concerning the nature and extent of contamination at SWMUs 10, 12, 24, 25, and 26 and to determine, based on the collected data, whether additional interim measures activities are necessary at these SWMUs to reduce or eliminate risk to human health or the environment. Based on the results of this interim measures investigation, the need for remedial interim measures activities at each SWMU was assessed. Remedial interim measures activities are recommended for SWMU 10. A workplan detailing proposed remedial interim measures activities for SWMU 10 will be submitted within 60 days of the date of this report.

As described in Section 3, interim measures objectives have been satisfied for SWMUs 12, 24, 25, and 26; however, further investigation activities will be completed at SWMUs 12, 24, and 25 to fulfill RFI objectives. RFI objectives are to define a SWMU's nature and extent of contamination and to determine the need for a corrective measures study (CMS) at that SWMU. Although remedial interim measures activities are unnecessary for SWMUs 12, 24, and 25, additional nature and extent of contamination information is required for these SWMUs. Additional investigation activities at SWMU 12 are already outlined in the RFI Workplan (BMWCI, 1997). An addendum to the RFI Workplan detailing planned investigation activities for SWMUs 24 and 25 will be submitted within 60 days of the date of this report.

Since contaminant levels of concern were not identified at SWMU 26, interim measures and RFI objectives have been satisfied. No further remedial or investigation activities will be completed for SWMU 26.

* * * * *

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Zeller, D.E. (editor). *The Stratigraphic Succession in Kansas*: Bulletin 189, State Geological Survey of Kansas, 1968.

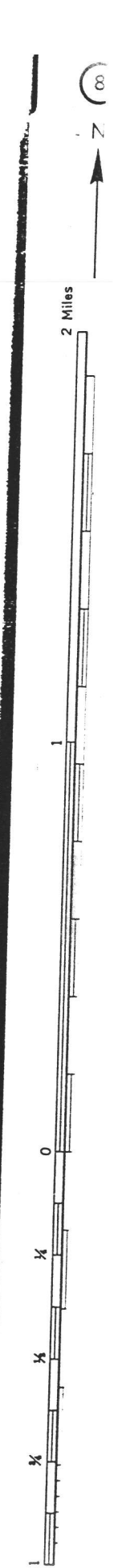
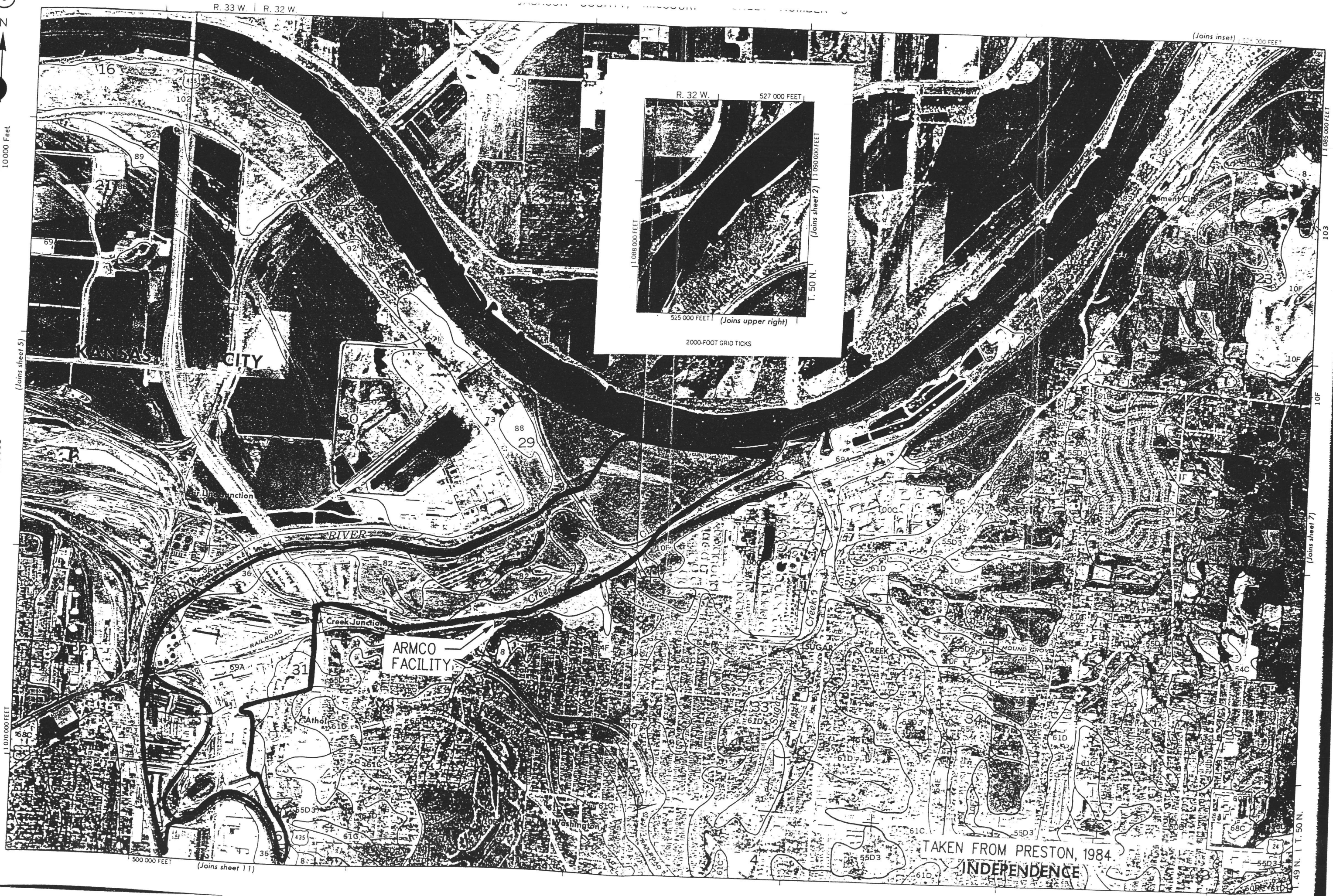
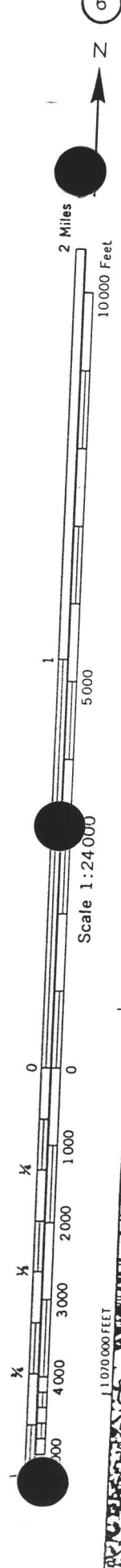
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APPENDIX A
SOIL SURVEY MAP

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is eroded and 3 that it is severely eroded.

SYMBOL	NAME
1B	Sibley silt loam, 2 to 5 percent slopes
1C	Sibley silt loam, 5 to 9 percent slopes
2C	Higginsville silt loam, 5 to 9 percent slopes
5B	Macksburg silt loam, 2 to 5 percent slopes
6B	Sharpsburg silt loam, 2 to 5 percent slopes
6C2	Sharpsburg silt loam, 5 to 9 percent slopes, eroded
8	Pits, quarries
10D	Snead-Rock outcrop complex, 5 to 14 percent slopes
10F	Snead-Rock outcrop complex, 14 to 30 percent slopes
11C	Greenton silty clay loam, 5 to 9 percent slopes
13B	Sampsel silty clay loam, 2 to 5 percent slopes
13C	Sampsel silty clay loam, 5 to 9 percent slopes
15B	Menfro silt loam, 2 to 5 percent slopes
15C2	Menfro silt loam, 5 to 9 percent slopes, eroded
16D3	Menfro silty clay loam, 9 to 14 percent slopes, severely eroded
17B	Polo silt loam, 2 to 5 percent slopes
17C2	Polo silt loam, 5 to 9 percent slopes, eroded
19B	Weller silt loam, 2 to 5 percent slopes
20C2	McGirk silt loam, 5 to 9 percent slopes, eroded
22C2	Oska silty clay loam, 5 to 9 percent slopes, eroded
30	Kennebec silt loam
31	Colo silty clay loam
33	Zook silty clay loam
36	Bremer silt loam
38	Wiota silt loam
47D	Mandeville silt loam, 5 to 14 percent slopes
54C	Knox silt loam, 5 to 9 percent slopes
54E	Knox silt loam, 14 to 20 percent slopes
54F	Knox silt loam, 20 to 30 percent slopes
55D3	Knox silty clay loam, 5 to 14 percent slopes, severely eroded
60B	Sibley-Urban land complex, 2 to 5 percent slopes
60C	Sibley-Urban land complex, 5 to 9 percent slopes
61C	Knox-Urban land complex, 5 to 9 percent slopes
61D	Knox-Urban land complex, 9 to 14 percent slopes
62B	Macksburg-Urban land complex, 2 to 5 percent slopes
63C	Higginsville-Urban land complex, 5 to 9 percent slopes
64C	Greenton-Urban land complex, 5 to 9 percent slopes
65F	Snead-Urban land complex, 9 to 30 percent slopes
68C	Urban land, upland, 5 to 9 percent slopes
68D	Urban land, upland, 9 to 14 percent slopes
69A	Urban land, bottom land, 0 to 3 percent slopes
73	Leta silty clay
82	Parkville silty clay
83	Haynie silt loam
87	Modale silt loam
88	Gilliam silty clay loam
89	Sarpy fine sand
90	Wabash silty clay
91A	Napier silt loam, 0 to 3 percent slopes
92	Cotter silt loam
100C	Urban land-Harvester complex, 2 to 9 percent slopes
102	Udifluvents, nearly level
103	Udorthents, nearly level



APPENDIX B
QUALITY CONTROL EVALUATION REPORT

TABLE OF CONTENTS

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1.2 Data Quality Parameters	1-1
1.3 Data Qualifier Definitions	1-2
1.4 Scope	1-3
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LIST OF ACRONYMS AND ABBREVIATIONS

BMWCI	Burns & McDonnell Waste Consultants Inc.
BS	Blank Spike
BSD	Blank Spike Duplicate
CLP	Contract Laboratory Program
CRDL	Contract Required Detection Limit
IDL	Instrument Detection Limit
ITS	Inchcape Testing Services
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NA	Not Applicable
NFGO	<u>National Functional Guidelines for Organic Data Review</u> , USEPA 1993
NFGI	<u>National Functional Guidelines for Inorganic Data Review</u> , USEPA 1994
PAH	Polynuclear Aromatic Hydrocarbons
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QCE	Quality Control Evaluation
RCRA	Resource Conservation and Recovery Act
REC	Percent Recovery
RFI	RCRA Facility Investigation
RPD	Relative Percent Difference
SDG	Sample Delivery Group
SVOCs	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
SW-846	<u>Test Methods for Evaluating Solid Waste</u>
TCLP	Toxicity Characteristic Leachate Procedure
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

* * * * *

1.0 INTRODUCTION

1.1 PURPOSE

This document presents the results of the quality control (QC) evaluation performed on analytical data collected between October 29, 1996, and November 11, 1996, from Solid Waste Management Units (SWMUs) 10, 12, 24, 25, and 26 at the Armco Facility in Kansas City, Missouri (Facility). Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) interim measures activities were presented in the Revised Interim Measures Plan dated February 1996 and its associated Addendum No.1 dated October 22, 1996.

Samples were collected for submittal to an off-site analytical laboratory. Inchcape Testing Services (ITS) of Richardson, Texas, performed the analytical services for this project. Laboratory Quality Assurance/Quality Control (QA/QC) procedures followed the United States Environmental Protection Agency's (USEPA's) protocol presented in Test Methods for Evaluating Solid Waste (SW-846). Further data validation was performed by Burns & McDonnell Waste Consultants, Inc (BMWCI) following procedures outlined in National Functional Guidelines for Organic Data Review (NFGO), USEPA 1993, and National Functional Guidelines for Inorganic Data Review (NFGI), USEPA 1994, in addition to SW-846 guidance.

1.2 DATA QUALITY PARAMETERS

Data collected during this investigation were evaluated for Level III parameters illustrated in Figures 1-1 and 1-2. Review items were grouped into the following data quality parameter categories for the purposes of this report: precision, accuracy, representativeness, completeness, and comparability.

Precision

Precision is a measure of the reproducibility of measurements made under a set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is assessed in a Level III review by examining field duplicate results and matrix spike duplicates (MSDs).

Accuracy

Accuracy is a measure of the deviation of a measurement from its true value. Laboratory analysis accuracy is assessed by completing surrogate and matrix spike (MS) recovery samples and running laboratory method blanks. Sampling accuracy is assessed by examining the results of submitted field QC samples, including equipment rinsate and trip blanks. Possible sources of error include inconsistent sampling, inconsistent analytical procedures, laboratory contamination, and field contamination.

Representativeness

Representativeness expresses the degree to which sample data precisely and accurately represent the contamination detected at the Facility. Representativeness is further addressed by explaining the rationale used to select sampling locations and analytical parameters.

Completeness

Completeness defines the percentage of measurements judged to be valid measurements. Field completeness is assessed by comparing the number of samples collected to the number of samples planned. Laboratory completeness is assessed by comparing the number of samples yielding valid data to the number of samples submitted for analysis.

Comparability

Comparability expresses the confidence with which one set of data may be compared to another. To address comparability, the standard techniques used to collect and analyze representative samples are evaluated.

1.3 DATA QUALIFIER DEFINITIONS

Data qualifiers are added by both the laboratory and BMWCI. These qualifiers are defined in the following manner:

Laboratory

- B: Analyte detected in laboratory method blank as well as sample
- J: Estimated value; concentration was below quantitation limit
- M: Indicates matrix has interfered with the recovery of the surrogates

- Q: Surrogate recovery is outside the defined QC limits
U: Compound was analyzed by the laboratory but not detected

BMWCI

- F: Analyte detected in equipment rinsate blank as well as sample
J*: Qualified as estimated from QC evaluation
R: Qualified as unusable from QC evaluation
T: Analyte detected in trip blank as well as sample
U*: Qualified as undetected from QC evaluation

1.4 SCOPE

The remainder of the QC evaluation is organized in the following sections:

- Section 2.0 provides an overview of the investigation.
- Section 3.0 provides a discussion of the calibration and maintenance of laboratory equipment.
- Section 4.0 provides a discussion of precision of duplicate sample results.
- Section 5.0 provides a discussion of the accuracy of spike and blank sample results.
- Section 6.0 provides a discussion on the representativeness of samples.
- Section 7.0 provides a discussion on the completeness of samples.
- Section 8.0 provides a discussion on the comparability of samples.
- Section 9.0 presents the conclusions of the QC evaluation.

* * * * *

Figure 1-1 Organic Data Validation Checklist

SDG No.: _____
Project Name: _____
Project No.: _____

Site: _____
Laboratory: _____
Analysis Type: _____

Instructions:

1. Initial and date this form at the start and end of review for this SDG.
2. Place a check mark in the "NA" column when the review item was not applicable.
3. When review of a checklist item is complete, place a check mark in the "Reviewed" column.
4. Place an "NS" designation in the "Reviewed" column when applicable data were not supplied.
5. Place a check mark or an "NR" in the "Qualified" column if related data did or did not require qualification, respectively.
6. See "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," February 1993, for validation purposes.
7. Level IV review is generally performed on 5-10% of all sample results; actual percentage is project specific.
8. Place a check mark in the box at the beginning of the Level IV section if no associated raw data were reviewed.

	NA	Reviewed	Qualified	Comments
Level III Review Item				
Signed Chain-of-Custody Available				
Requested Analyses Completed				
Holding Times Met				
Sample Preservation Acceptable				
Laboratory Method Blank Results				
Field Blank Results				
Trip Blank Results (VOC only)				
Surrogate Recoveries				
Laboratory Control Sample Results				
MS/MSD Results				
Field Duplicates				
Quantitation Limits				
Level IV Review Item	<input type="checkbox"/>	= Summary Sheets Only		
GC/MS Tuning				
Initial Calibrations				
Continuing Calibrations				
Internal Standards				
Enhanced Level IV Review Item				
Compound Identification				
Compound Quantitation				

Date Started/
Reviewer: _____

Date Completed/
Reviewer: _____

Figure 1-2 Inorganic Data Validation Checklist

SDG No.: _____
Project Name: _____
Project No.: _____

Site: _____
Laboratory: _____
Analysis Type: _____

Instructions:

1. Initial and date this form at the start and end of review for this SDG.
2. Place a check mark in the "NA" column when the review item was not applicable.
3. When review of a checklist item is complete, place a check mark in the "Reviewed" column.
4. Place an "NS" designation in the "Reviewed" column when applicable data were not supplied.
5. Place a check mark or an "NR" in the "Qualified" column if related data did or did not require qualification, respectively.
6. See "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," February 1994, for validation purposes.
7. Level IV review is generally performed on 5-10% of all sample results; actual percentage is project specific.
8. Place a check mark in the box at the beginning of the Level IV section if no associated raw data were reviewed.

	NA	Reviewed	Qualified		Comments
Level III Review Item					
Signed Chain-of-Custody Available					
Requested Analyses Completed					
Holding Times Met					
Sample Preservation Acceptable					
Laboratory Method Blank Results					
Field Blank Results					
Laboratory Control Sample Results					
Duplicate Sample Results					
Matrix Spike Results					
Field Duplicates					
Detection Limits					
Level IV Review Item <input type="checkbox"/> = Summary Sheets Only					
Initial Calibrations					
Initial/Continuing Calibration Verification					
ICP Interference Check Sample Results					
ICP Serial Dilution					
Enhanced Level IV Review Item					
Furnace Atomic Absorption QC					
Sample Result Verification					

Date Started/
Reviewer: _____

Date Completed/
Reviewer: _____

2.0 INVESTIGATION OVERVIEW

A total of 51 subsurface soil samples, 24 surface soil samples, and 7 groundwater samples (not including QC samples) were collected at the Facility during the interim measures investigation. Samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), RCRA metals, total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAH), pH, toxicity characteristic leachate procedure (TCLP), and/or hexavalent chromium. Table 2-1 contains a summary of the number of field and QC samples analyzed.

**Table 2-1
Sampling Summary**

Number of Field Samples		Number of Field Duplicate Pairs	Number of MS/MSDs	Number of Field Rinsate Blanks	Number of Trip Blanks
Subsurface soil = 51	Water = 7	8	8	7	3
Surface soil = 24					

* * * * *

3.0 LABORATORY EQUIPMENT CALIBRATION AND MAINTENANCE

All calibration, tuning, and maintenance of equipment was performed by ITS. The laboratory was responsible for the maintenance of equipment used during analytical procedures ensuring that backup systems and equipment were available, as required by SW-846. ITS did not report any problems in these areas.

* * * * *

4.0 PRECISION

The precision of analytical data is assessed by reviewing duplicate sample results. Field duplicate samples, inorganic laboratory duplicates, and MS/MSDs were collected at a minimum frequency of 5 percent. Comparison of field duplicate to associated field sample results represents the project's precision performance. Precision is mathematically expressed in terms of relative percent difference (RPD), which is calculated in the following manner:

$$RPD = \frac{(D1 - D2)}{(D1 + D2)/2} \times 100$$

where: D1 = First duplicate result

D2 = Second duplicate result

If variability does not occur between two measurements, then the RPD equals 0. All RPDs were reported as absolute values. Any problems encountered with the duplicates are discussed in the following sections.

4.1 LABORATORY DUPLICATES FOR INORGANICS

In laboratory duplicate analysis for inorganics, a sample is split in two fractions and analyzed for inorganic parameters. The RPD is calculated from the two concentration values. The NFGI specifies a maximum absolute RPD value of 20 percent for water samples and 35 percent for soil samples. If the laboratory specified a more conservative maximum RPD value it was used instead of the NFGI value. If the concentration for one or both parts of the duplicate pair has a concentration less than five times the instrument detection limit (IDL), then a sensitivity test is applied. The NFGI defines the sensitivity test in terms of the Contract Laboratory Program (CLP)-specific term "Contract Required Detection Limit (CRDL)." Because samples for this investigation were analyzed with non-CLP methodologies, reporting limits were used instead of CRDLs in the sensitivity test. The sensitivity test used to evaluate these data required that the maximum difference in concentration between the two parts of the duplicate pair should not exceed plus or minus (\pm) the lower reporting limit for water samples and \pm two times the lower reporting limit for soil samples. If an analyte's RPD value exceeds 20 percent for a water sample, 35 percent for a soil sample, or the analyte fails the sensitivity test, then all results (positive and undetect) for that analyte must be qualified as estimated (J*) in all associated samples.

Cadmium in Sample 24T4/SB3 (Sample Delivery Group (SDG) D96-12805) had a RPD of 30.6 percent, which exceeded the QC maximum of 25 percent, given by the lab. The cadmium results in the following associated samples were qualified as estimated (J*): 24T2/SB1, 24T2/SB2, 24T2/SB3, 24T4/SB1, 24T4/SB2, 24T4/SB3, 24T5/SB1, 24T5/SB2, 24T5/SB3, 24T6/SB1, 24T6/SB2, 24T6/SB2D, 24T6/SB3, and 24T6/GW1.

4.2 MATRIX SPIKE/MATRIX SPIKE DUPLICATES

In MS/MSD analysis, a known quantity of the analyte of interest is added to the MS and MSD portions by the laboratory prior to analysis. The portions are analyzed and the RPD is calculated from the results of each portion. The RPD value gives information on the ability of the laboratory to reproduce results and accounts for error introduced from preparation, analysis, and matrix interference on analyte recovery.

The parameters in MS/MSD analyses and acceptable maximum RPDs, as determined by ITS, are presented in Table 4-1. ITS developed these QC limits based on guidance provided in SW-846.

Eight samples were designated by BMWCI for MS/MSD analyses. Each SWMU had designated MS/MSD samples for each matrix sampled. Analyses for MS/MSD samples varied according to the chosen analyses for each SWMU.

MS/MSD results were generally within required QC limits; therefore, duplication of results was acceptable. Exceedences of QC limits encountered in MS/MSD analyses are discussed in the following subsections.

4.2.1 Inorganics

In accordance with NFGI and SW-846, if an inorganic analyte's RPD value exceeds the QC limit, then all results (positive and undetect) for that analyte must be qualified as estimated (J*) in all associated samples.

The RPD value of lead in MS/MSD Sample 10G3/SR1 (SDG D96-12266) was 108 percent, exceeding the QC maximum limit of 25 percent. No conclusion could be made about the lead analysis due to the spike concentration being less than one-fourth the sample concentration, therefore, no action was taken.

Chromium in MS/MSD Sample 24G2/SR1 (SDG D96-12383) had a RPD value of 54.5 percent, exceeding the QC maximum limit of 25 percent. All associated samples were qualified as estimated (J*).

The RPD value of lead in MS/MSD Sample 25B2/CS2 (SDG D96-12547) was 31.9 percent, exceeding the QC maximum limit of 25 percent. No conclusion could be made about the precision of the lead analysis due to the spike concentration being less than one-fourth the sample concentration, therefore, no action was taken.

The RPD value of silver in MS/MSD Sample 25B2/CS2 (SDG D96-12547) was 42.9 percent, exceeding the QC maximum limit of 30 percent. All positive and non-detect silver results in the associated samples were qualified as estimated (J*).

4.2.2 Organics

The NFGO suggests that no action be taken on MS/MSD results alone to qualify data for organic parameters. MS/MSD results for organics were evaluated to determine the extent to which data may have been affected.

The RPD for TPH in MS/MSD Sample 24G2/SR1 (SDG D96-12383) was 88.5 percent, which exceeded the QC maximum limit of 25 percent.

Sample 25B2/CS2 (SDG D96-12547) had TPH RPDs out of limits for two batches, AB925-70 and 28-111396. Batch AB925-70 had a high RPD recovery (REC) of 12,800 percent. The QC limit was 25 percent. No conclusion could be made on this recovery because the spike amount was less than one-fourth of the sample concentration. Batch 28-111396 RPD REC was 72 percent, exceeding its QC maximum limit of 25 percent.

Sample 12MW1/GW1(SDG D96-14212) matrix spike duplicate extract was spilled during preparation, hence, the sample was not analyzed. The batch could not be re-extracted due to insufficient sample volume. However, the blank spike (BS) and blank spike duplicate (BSD) exhibited recoveries within limits, therefore, they were used to validate the data.

4.3 FIELD DUPLICATES

Neither the NFGI nor the NFGO contains specific guidelines or QC limits for qualifying data from field duplicate results. For the purpose of QC evaluations, BMWCI applies the following modified version of the NFGI's inorganic laboratory duplicate criteria to field duplicate results:

- For analytes detected in both portions at concentrations greater than five times their quantitation limits, an RPD test is applied. Field duplicate results meet this criterion if the RPD value does not exceed 20 percent for water samples or 35 percent for soil samples.
- For analytes detected in both portions where at least one of the results was less than five times its quantitation limit, a sensitivity test is applied. Field duplicate results meet this criterion if the difference in the two values does not exceed the quantitation limit for water samples or two times the quantitation limit for soil samples.
- For an analyte detected in only one portion, the field duplicate results meet the BMWCI QC requirements if the detected amount is within \pm the other portion's quantitation limit.
- For analytes not detected in either portion, field duplicate precision cannot be assessed if dilution factors in the two portions vary from each other by a factor of five or more.

The BMWCI field duplicate criteria provide information on the ability to reproduce field results and account for error introduced from handling, shipping, storage, preparation, and analysis of field samples. Since more possible routes exist to introduce error into field duplicates as compared to laboratory inorganic duplicates, RPD values for field duplicates are thus anticipated to be higher than those for inorganic laboratory duplicates.

Eight sets of field duplicates were collected during this sampling event. Field duplicate results are listed in Table 4-2. Ten field duplicates failed a RPD test and eight field duplicates failed a sensitivity test. The majority of the results were replicated.

* * * * *

Table 4-1
Allowable Matrix Spike/Matrix Spike Duplicate
RPD Values for Soil
RFI Interim Measures
Armco Kansas City Facility

Parmameter	RPD Limit (%)
VOCs	
1,1-Dichloroethene	20
Trichloroethene	20
Benzene	20
Toluene	20
Chlorobenzene	20
PAH	
Acenaphthene	28
Pyrene	25
TPH	
TPH	25
RCRA Metals	
Silver	30
Arsenic	25
Barium	20
Cadmium	25
Chromium	25
Mercury	25
Lead	25
Selenium	25

RPD = Relative Percent Difference
VOC = Volatile Organic Compounds
PAH = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
RCRA = Resource Conservation and Recovery Act

Table 4-2
Field Duplicate Results
RFI Interim Measures
Armco Kansas City Facility

Sample Point: Sample Delivery Group:		Original 10G2/SR2 D96-12266	Duplicate 10G2/SR2D D96-12266	Meets QC Criteria (Y/N)
Parameter	Units			
RCRA Metals				
Cadmium	mg/Kg	38.5	38	Y
Lead	mg/Kg	1200	1290	Y

Sample Point: Sample Delivery Group:		Original 24G1/SR2 D96-12383	Duplicate 24G1/SR2D D96-12383	Meets QC Criteria (Y/N)
Parameter	Units			
PAH				
Anthracene	mg/Kg	1.46	3.94	Y (sensitivity test)
Benzo (a) anthracene	mg/Kg	3.44	7.13	Y (sensitivity test)
Benzo (b) fluoranthene	mg/Kg	4.15 U	11.4	N (sensitivity test)
Benzo (a) pyrene	mg/Kg	4.15 U	6.62	N (sensitivity test)
Chrysene	mg/Kg	2.99 J	8.11	Y (sensitivity test)
Fluoranthene	mg/Kg	5.04	14.4	N (sensitivity test)
Phenanthrene	mg/Kg	7.74	20.6	N (sensitivity test)
Pyrene	mg/Kg	7.4	20.1	N (sensitivity test)
TPH				
TPH (batch AB925-39)	mg/Kg	893	2050	N (RPD=78%)
TPH (batch 26-110796)	µg/Kg	142	345	N (RPD=83%)
RCRA Metals				
Barium	mg/Kg	159	188	Y
Cadmium	mg/Kg	13.7	15	Y
Chromium	mg/Kg	84	134	N (RPD= 46%)
Mercury	mg/Kg	0.151 U	0.190	N (sensitivity test)
Lead	mg/Kg	464	409	Y

Sample Point: Sample Delivery Group:		Original 25B2/CS2 D96-12547	Duplicate 25B2/CS2D D96-12547	Meets QC Criteria (Y/N)
Parameter	Units			
PAH				
Benzo (a) anthracene	mg/Kg	0.603	0.52	Y (sensitivity test)
Benzo (b) fluoranthene	mg/Kg	0.874	0.503	Y (sensitivity test)
Benzo (k) fluoranthene	mg/Kg	0.272	0.604	Y (sensitivity test)
Benzo (g,h,i) perylene	mg/Kg	0.317	0.415	Y (sensitivity test)
Benzo (a) pyrene	mg/Kg	0.546	0.611	Y (sensitivity test)
Chrysene	mg/Kg	0.845	0.759	Y (sensitivity test)
Dibenz (a,h) anthracene	mg/Kg	0.334	0.324	Y (sensitivity test)
Fluoranthene	mg/Kg	1.05	0.783	Y (sensitivity test)
Indeno (1,2,3-cd) pyrene	mg/Kg	0.603	0.572	Y (sensitivity test)
Phenanthrene	mg/Kg	0.34	0.756	N (sensitivity test)
Pyrene	mg/Kg	1.42	1.12	Y (sensitivity test)
TPH				
TPH (batch AB925-70)	mg/Kg	442	244	N (RPD= 58%)
TPH (batch 28-111396)	µg/Kg	436	236	N (RPD= 60%)
RCRA Metals				
Barium	mg/Kg	350	357	Y
Cadmium	mg/Kg	45.6	41.2	Y
Chromium	mg/Kg	620	690	Y
Mercury	mg/Kg	0.135U	0.918	N (sensitivity test)
Lead	mg/Kg	620	656	Y

Table 4-2 (continued)
Field Duplicate Results
RFI Interim Measures
Armco Kansas City Facility

Sample Point: Sample Delivery Group:		Original 25G2/SR1 D96-12650	Duplicate 25G2/SR1D D96-12650	Meets QC Criteria (Y/N)
Parameter	Units			
PAH				
Chrysene	mg/Kg	0.207	0.219	Y (sensitivity test)
Pyrene	mg/Kg	0.252	0.29	Y (sensitivity test)
TPH				
TPH (batch AB925-82)	mg/Kg	138	97.2	Y (sensitivity test)
TPH (batch 26-111496)	µg/Kg	111	102	Y (sensitivity test)
RCRA Metals				
Barium	mg/Kg	225	282	Y
Cadmium	mg/Kg	34.9	28.2	Y
Chromium	mg/Kg	1070	572	N (RPD=60%)
Lead	mg/Kg	289	359	Y

Sample Point: Sample Delivery Group:		Original 24T1/SB2 D96-12760	Duplicate 24T1/SB2D D96-12760	Meets QC Criteria (Y/N)
Parameter	Units			
PAH				
Fluoranthene	mg/Kg	0.191	0.355	Y (sensitivity test)
Phenanthrene	mg/Kg	0.237	0.478	Y (sensitivity test)
Pyrene	mg/Kg	0.169	0.315	Y (sensitivity test)
TPH				
TPH (batch AB925-95)	mg/Kg	178	113	N (RPD=44.6%)
TPH (batch 2-111596)	µg/Kg	159	175	Y
RCRA Metals				
Barium	mg/Kg	331	245	Y
Cadmium	mg/Kg	31.1	22.8	Y
Chromium	mg/Kg	72.4	325	N (RPD=127%)
Lead	mg/Kg	401	290	Y

Sample Point: Sample Delivery Group:		Original 24T6/SB2 D96-12805	Duplicate 24T6/SB2D D96-12805	Meets QC Criteria (Y/N)
Parameter	Units			
PAH				
Phenanthrene	mg/Kg	0.253	0.515	Y (sensitivity test)
Pyrene	mg/Kg	0.229	0.622	Y (sensitivity test)
TPH				
TPH (batch AB926-3)	mg/Kg	60.8	67.8	Y
TPH (batch 2-111496)	µg/Kg	223	334	N (RPD=39%)
RCRA Metals				
Barium	mg/Kg	245	203	Y
Cadmium	mg/Kg	20.4	18.2	Y
Chromium	mg/Kg	256	164	N (RPD=44%)
Lead	mg/Kg	340	245	Y

Sample Point: Sample Delivery Group:		Original 12MW4/GW1 D96-14212	Duplicate 12MW4/GW1D D96-14212	Meets QC Criteria (Y/N)
Parameter	Units			
TPH				
TPH	mg/Kg	0.56	0.8	Y (sensitivity test)

QC = Quality Control
PAH = Polynuclear Aromatic Hydrocarbon
TPH = Total Petroleum Hydrocarbons
RCRA = Resource Conservation and Recovery Act

RPD = Relative Percent Difference
mg/Kg = Milligrams per Kilograms
µg/Kg = Micrograms per Kilograms

5.0 ACCURACY

Accuracy is a measure of the deviation of a measurement from its true value. Possible sources of error include inconsistent sampling, inconsistent analytical procedures, laboratory contamination, and field contamination. The accuracy of chemical results for this set of data is assessed by examining the results of spike recovery and blank samples.

Accuracy of spike samples is assessed by examining REC values. A spike sample is prepared by splitting a sample into two portions, spiking one of the samples (adding a known quantity of the constituent of interest) and analyzing both portions as independent samples. The REC is then calculated in the following manner:

$$REC = \frac{SSR - SR}{SA} \times 100$$

where: SSR = Spike Sample Results

SR = Sample Results

SA = Spike Added

Perfect accuracy would be defined as 100 percent recovery. An elevated REC value indicates high sensitivity in detecting a compound; therefore, all results indicating compounds which were not detected are still considered valid. A low REC value indicates low sensitivity in detecting a compound (i.e., the possibility of a false negative exists). Matrix spike, surrogate spike, and laboratory control sample recoveries were evaluated for organic analyses. Matrix spike recoveries were also evaluated for RCRA metal analyses.

Accuracy is also assessed through the evaluation of laboratory method, equipment rinsate, and trip blank samples. The presence of compounds in these QC samples gives information on contamination from handling of samples, either in the laboratory or the field. The results of these analyses allow the interpreter of the data to account for suspected positive detections.

5.1 SURROGATES

Surrogate analysis gives a measure of the laboratory's recovery performance on individual samples.

Surrogates are compounds not commonly found in environmental samples. As specified in the NFGO, if the REC value for a surrogate is out of QC limits, then a re-analysis should be performed. If the re-analysis is also unsuccessful, results for the sample should be qualified according to the following criteria:

- If two base/neutral or two acid extractable surrogates from an SVOC analysis or one surrogate from any other organic analysis have REC values above the maximum QC limit, then positive detections of associated analytes in that sample should be qualified as estimated (J*); associated non-detect analytes do not require qualification.
- If two base/neutral or two acid extractable surrogates from an SVOC analysis or one surrogate from any other organic analysis have REC values below the minimum QC limit (but are at least 10 percent), then all associated analytes (positive and undetect) in that sample should be qualified as estimated (J*).
- If a surrogate REC value is less than 10 percent, then the undetected (U) results should be qualified as unusable (R) and the positive detections as estimated (J*)

Extractable organic surrogates may give meaningless results if the sample is diluted beyond a certain point. In these cases, no conclusion about the analysis accuracy can be drawn from the surrogate results.

The parameters in surrogate analyses and acceptable QC limits, as determined by ITS, are presented in Table 5-1. ITS developed these QC limits based on guidance provided in SW-846.

ITS chose to send only the reanalysis results when surrogates were outside the QC limits. Therefore, any surrogate REC values outside the QC limits were qualified as indicated above. Tables 5-2 through 5-5 illustrate surrogate REC values that were not within QC limits and the action taken for each case.

VOC surrogate REC values for dibromofluoromethane were not within QC limits in five samples spread throughout two SDGs (see Table 5-2). Sample 24T2/SB1 (SDG D96-12805) had a recovery of 8 percent,

which was less than the NFGO guideline of 10 percent, therefore, all of the undetected analytes in the sample were qualified as unusable (R). All of the analytes in the other four samples were qualified as estimated (J*) due to their surrogate REC values being less than their QC minimum values but greater than 10 percent.

TPH parameters triacontane and fluorobenzene had a number of samples with surrogate REC values not within their QC limits (see Table 5-3). No samples were qualified as unusable (R) due to their surrogate REC values, however, many were qualified as estimated (J*).

PAH surrogate REC values for terphenyl-d14 were not within QC limits in five samples (see Table 5-4). No data was qualified since only one surrogate parameter was not within QC limits for each PAH sample.

SVOC surrogate REC values for tribromophenol, phenol-d6, 2,4,6-tribromophenol, and 2-fluorobiphenyl were not within QC limits (see Table 5-5). No data was qualified since only one SVOC surrogate parameter was not within QC limits in each sample.

5.2 MATRIX SPIKES

MS analyses are performed to determine laboratory performance with respect to the accuracy of an analytical method for a particular matrix. For a MS, known amounts of a subset of analytes are added to the sample. Samples for MS analysis were collected and analyzed at a minimum frequency of once every 20 field samples. MS results represent the recovery performance for the associated field samples. Allowable MS/MSD REC values for soil are presented in Table 5-6.

5.2.1 Inorganics

The NFGI and SW-846 give the following specific guidelines for qualifying data from inorganic MS results:

- For a recovery value greater than 125 percent (except for silver), all positive detections are qualified as estimated (J*) and all undetected values are acceptable for use without qualification.

- For a recovery value between 30 and 74 percent (except for silver), all undetected and detected values are qualified as estimated (J*).
- Recovery values for silver should be between 60 and 140 percent. All positive detections above 140 percent are qualified as estimated (J*) and all undetected values are acceptable without qualification. For detections below 60 percent (but above 30 percent) all undetected and detected values are qualified as estimated (J*).
- For a recovery value less than 30 percent, all non-detect values are qualified as unusable (R) and all detect values are qualified as estimated (J*).
- No conclusion can be drawn about the accuracy of the spike recovery if the spike amount is less than one-fourth the original sample concentration.

The MS and MSD REC values for lead in Sample 10G3/SR1 (SDG D96-12266) were 2840 and 2970 percent, respectively. These exceeded the QC maximum of 125 percent (see Table 5-7). No conclusion could be made about the MS/MSDs due to the spike concentration being less than one-fourth the sample concentration.

Sample 24G2/SR2 (SDG D96-12383) had three analytes that had MS/MSD recoveries not within their respective QC limits, all of which were qualified as estimated (J*) (see Table 5-7). Cadmium had a MSD REC value of 74 percent, which did not meet the QC minimum of 75 percent. Chromium MS and MSD had recovery values of 63 percent and 36 percent, respectively. These were both less than the QC minimum of 75 percent. Lead had a MSD REC value of 70 percent, which did not meet its QC minimum of 75 percent.

The MS and MSD REC values for silver, Sample 25B2/CS2 (SDG D96-12547) (batch 15077), were 51 and 33 percent, respectively, which fell below the QC minimum of 60 percent. All results for associated samples were qualified as estimated (J*) for silver (see Table 5-7).

5.2.2 Organics

The NFGO suggests that no action be taken on MS/MSD results alone to qualify data for organic parameters. MS/MSD results for organics were evaluated to determine the extent to which data may have been affected. The organic parameters in MS/MSD analyses and the corresponding REC values are presented in Table 5-8.

TPH Sample 24G2/SR1 (SDG D96-12383) had MS and MSD REC values of 496 and 191 percent, respectively, which exceeded the QC maximum limit of 150 percent.

TPH Batch 28-111396 in Sample 25B2/CS2 (SDG D96-12547) had low MS and MSD REC values of 1.6 and 3.4 percent, respectively. Their QC minimum was 70 percent. The TPH was reanalyzed as Batch AB925-70. No conclusion could be made on the reanalysis because the spike concentration was less than one-fourth the sample concentration.

The SVOC MS/MSD in Sample 25B2/CS2 (SDG D96-12547) had 4-nitrophenol MS and MSD REC values that were 2.2 and 2.8 percent, respectively. Both of these values were below the QC minimum of 10 percent. Pentachlorophenol MS and MSD REC values of 2.7 and 3 percent, respectively, were below the QC minimum of 14 percent.

5.3 LABORATORY METHOD BLANKS

As specified in the NFGO and NFGI, any laboratory blank with a positive detection for an analyte is used to qualify the data for associated field samples. Sample results for that analyte are qualified as undetected (U*) if the value in an associated sample is less than five times the value in the laboratory blank, except for the following common laboratory contaminants: acetone, 2-butanone, methylene chloride, and common phthalate esters. For these common laboratory contaminants, results are qualified as undetected (U*) if the sample value is less than 10 times the method blank concentration. Dilution and moisture corrections are taken into account when determining if field data needs to be qualified.

No positive detections of target analytes were found in the method blanks.

5.4 EQUIPMENT RINSATE BLANKS

The NFGO and NFGI do not include specific guidelines on the qualification of data from field equipment rinsate blank results. To indicate a detection of a compound in a rinsate blank, it is BMWCI policy to add a qualifier (F) to associated sample results for all detected values of the same parameters.

Seven equipment rinsate blanks were collected for this sampling event. Cadmium, chromium, and lead were qualified "F" in several associated samples (see Table 5-9).

5.5 TRIP BLANKS

Trip blanks accompany field samples throughout a sampling event, but remain unopened. Trip blanks are analyzed for volatile organics to indicate if any cross contamination occurred during the handling of the samples. The NFGO does not have specific guidelines on the qualification of data from trip blank results. If a positive detection occurs in a trip blank, it is BMWCI policy to qualify (T) as needed to any associated field sample with a detected value for the same parameter.

Two trip blanks were analyzed for this sampling event. Positive detections of target analytes were not found in either trip blank.

5.6 LABORATORY CONTROL SAMPLES

A Laboratory Control Sample (LCS) is a control sample which is either purchased or prepared by the laboratory with a known amount of a target analyte and is analyzed with the field samples. One LCS is run for a maximum of 20 samples. The purpose of a LCS is to determine the performance of the laboratory with respect to analyte recovery independent of field sample matrix interferences.

If LCS QC limits are not met, SW-846 methodology requires corrective actions be taken. For minor deviations from the LCS QC limits the corrective action may only involve reanalysis of those analytes not meeting the LCS QC limits. For major deviations from the LCS QC limits, re-extraction and reanalysis of all associated samples is performed. In extreme cases when all corrective actions have been implemented, documented, and the laboratory is unable to perform further re-extractions and reanalyses due to circumstances beyond its control, qualification of samples associated with the LCS is required. Under

such conditions, data falling outside of LCS control limits are qualified using guidelines set forth in NFGI and NFGO:

Inorganic Parameters

- Aqueous Matrix
 - For analytes with a recovery value greater than 120 percent, all positive detections of the same analyte are qualified as estimated (J*) and all undetected values are acceptable for use without qualification.
 - For analytes with a recovery value between 50 and 79 percent, all undetected and detected values of the same analyte are qualified as estimated (J*).
 - For analytes with a recovery value less than 50 percent, all detected and undetected values of the same analyte are qualified as unusable (R).
- Solid Matrix
 - For analytes with a recovery value greater than the maximum QC limit established by the laboratory, all positive detections of the same analyte are qualified as estimated (J*) and all undetected values are acceptable for use without qualification.
 - For analytes with a recovery value less than the lower QC limit established by the laboratory, all positive and undetected values of the same analyte are qualified as estimated (J*).

Organic Parameters

- For parameters with LCS REC values above the upper QC limit, positive detections of the same analyte in associated samples are qualified as estimated (J*) and undetected results of the same analyte in associated samples are not qualified.
- For parameters with LCS REC values below the lower QC limit, positive detections of the same analyte in associated samples are qualified as estimated (J*) and undetected results of the same analyte in associated samples are qualified as unusable (R).

- If greater than half of the compounds in a full-analyte-list LCS analysis do not meet QC criteria, all associated positive detections of target analytes are qualified as estimated (J*) and all associated undetected target compound results are qualified as unusable (R).

All LCS REC values were within QC limits.

* * * * *

Table 5-1
Allowable Surrogate REC Ranges
RFI Interim Measures
Armco Kansas City Facility

Parameter	Water (%)	Soil (%)
VOC		
Dibromofluoromethane	NA	80-120
Toluene-d8	85-120	81-117
Bromofluorobenzene	85-120	74-121
1,2-Dichloroethane-d4	80-120	NA
PAH		
Nitrobenzene-d5	35-114	23-120
2-Fluorobiphenyl	43-116	30-115
Terphenyl-d14	33-141	18-137
TPH		
Triacontane	40-140	60-140
Fluorobenzene	75-125	70-130

REC = Percent Recovery
VOC = Volatile Organic Compounds
PAH = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons

Table 5-2
VOC Surrogate Recoveries not within QC Limits
RFI Interim Measures
Armco Kansas City Facility

		Parameter VOC	Action			
QC REC Limits:		Dibromofluoromethane 80-120 %	All (J*)	Positive (J*)	No Conclusion	Non-detects (R)
Sample Number	SDG					
24T3/SB1	D96-12760	42.8	X			
24T3/SB2		45.8	X			
24T1/SB4		51.6	X			
24T2/SB1	D96-12805	8				X
24T5/SB1		50.1	X			

VOC = Volatile Organic Compounds
QC = Quality Control
REC = Percent Recovery
SDG = Sample Delivery Group

Table 5-3
TPH Surrogate Recoveries not within QC Limits
RFI Interim Measures
Armco Kansas City Facility

		Surrogate Parameters and QC Limits		Action			
		TPH		All (J*)	Positive (J*)	No Conclusion	Non-detects (R)
QC REC Limits		Triacotane 60-140 %	Fluorobenzene 70-130 %				
Sample Number	SDG						
24GA/SR1	D96-12131	167	OK		X		
24G1/SR1	D96-12383	200	OK		X		
24G1/SR2		152	OK		X		
24G1/SR2D		200	OK		X		
24G3/SR2		200	OK		X		
24G4/SR1		188	OK		X		
24G4/SR2		200	OK		X		
25B1/CS1	D96-12547	200	156		X		
25B1/CS2		184	159		X		
25B2/CS1		200	131		X		
25B2/CS2		200	154		X		
25B2/CS2D		152	143		X		
25B2/CS3		162	OK		X		
25B3/CS1		57.7	236		X		
25B3/CS2		OK	146		X		
25B4/CS1		OK	143		X		
25B4/CS2		19.7	OK	X			
25B4/CS3		200	OK		X		
25B5/CS1		OK	161		X		
25B5/CS2		50.4	157	X			
25B6/CS1		200	172		X		
25B6/CS2		200	190		X		
25B7/CS1		152	141		X		
25B7/CS2		49.7	162	X			
25B7/CS3		200	185		X		
25B8/CS1		200	19	X			
25B8/CS2		160	230		X		
25B8/CS3		9.5	154	X			
25G1/SR1	D96-12650	200	OK		X		
25G2/SR1		194	OK		X		
25G3/SR1		168	OK		X		
25G4/SR1		200	OK		X		
24T3/SB1	D96-12760	52	OK	X			

Table 5-3 (continued)
TPH Surrogate Recoveries not within QC Limits
RFI Interim Measures
Armco Kansas City Facility

QC REC Limits		Surrogate Parameters and QC Limits		Action			
		TPH		All (J*)	Positive (J*)	No Conclusion	Non-detects (R)
		Triacontane 60-140 %	Fluorobenzene 70-130 %				
Sample Number	SDG						
24T3/SB2		46.3	OK	X			
24T1/SB2		38.7	OK	X			
24T1/SB2D		36	OK	X			
24T1/SB4		37.4	OK	X			
24T2/SB2	D96-12805	OK	166		X		
24T4/SB1		59.2	150	X			
24T4/SB2	D96-12805	OK	143		X		
24T5/SB1		200	159		X		
24T6/SB1		200	169		X		
24T6/SB2		OK	139		X		
24T6/SB2D		OK	158		X		

TPH = Total Petroleum Hydrocarbon
 QC = Quality Control
 REC = Percent Recovery
 SDG = Sample Delivery Group
 OK = Surrogate was within QC Limits

Table 5-4
PAH* Surrogate Recoveries not within QC Limits
RFI Interim Measures
Armco Kansas City Facility

		Parameter					
		PAH Soil	Action				
		Terphenyl-d14*	All (J*)	Positive (J*)	No Conclusion	Non-detects (R)	No Action Required
QC REC Limits:		18-137 %					
Sample Number	SDG						
25B6/CS1	D96-12547	150					X
25B6/CS2		152					X
25B7/CS1		160					X

		Parameter					
		PAH Groundwater	Action				
		Terphenyl-d14*	All (J*)	Positive (J*)	No Conclusion	Non-detects (R)	No Action Required
QC REC Limits:		33-141 %					
Sample Number	SDG						
12MW4/GW1	D96-14212	23.2					X
24T6/GW1	D96-12805	24.6					X

* = Two Surrogates must be out of QC limits in order to qualify the data, or one surrogate must be below 10 % REC for SVOC Acid Extractables and Base Neutrals.

PAH = Polynuclear Aromatic Hydrocarbons

QC = Quality Control

SDG = Sample Delivery Group

Table 5-5
SVOC Surrogate Recoveries not within QC Limits
RFI Interim Measures
Armco Kansas City Facility

		Surrogate Parameters and QC Limits			Action				
		SVOCs							
	QC REC Limits	Phenol-d6	2,4,6-Tribromophenol	2-Fluorobiphenyl	All (J*)	Positive (J*)	No Conclusion	Non-detects (R)	No Action Required
		10-94 %	10-123 %	43-116 %					
Sample Number	SDG								
12MW4/GW1	D96-14212	97.7	OK	OK					X
OWA6/GW1		OK	173	OK					X
OWA6/GW1		OK	OK	128					X
12MW4/CS1	D96-14052	OK	134	OK					X

SVOC = Semivolatile Organic Compound
 QC = Quality Control
 REC = Percent Recovery
 SDG = Sample Delivery Group
 OK = Surrogate was within QC Limits

Table 5-6
Allowable Matrix Spike/Matrix Spike Duplicate
REC Values for Soil
RFI Interim Measures
Armco Kansas City Facility

Parameter	REC Limits (%)
VOCs	
1,1-Dichloroethene	70-130
Trichloroethene	70-130
Benzene	70-130
Toluene	70-130
Chlorobenzene	70-130
PAH	
Acenaphthene	47-145
Pyrene	52-115
TPH	
TPH	30-150
RCRA Metals	
Silver	60-140
Arsenic	75-125
Barium	75-125
Cadmium	75-125
Chromium	75-125
Mercury	75-125
Lead	75-125
Selenium	75-125

REC = Percent Recovery
VOC = Volatile Organic Compounds
PAH = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
RCRA = Resource Conservation Recovery Act

Table 5-7
Inorganic Matrix Spike Results
RFI Interim Measures
Armco Kansas City Facility

Parameter	SDG	Spike Sample	MS REC	REC Limits	Associated Samples	Action Taken
Lead	D96-12266	10G3/SR1	2840	75-125	10G1/SR1 10G1/SR2 10G4/SR1 10G5/SR2 10G2/SR1 10G2/SR2D 10G5/SR1 10G6/SR1 10G4/SR2 10G6/SR2 10G2/SR2 10G3/SR1 10G3/SR2	NC
Chromium	D96-12383	24G2/SR1	63	75-125	24G1/SR1 24G1/SR2 24G1/SR2D 24G2/SR1 24G2/SR2 24G3/SR1 24G3/SR2 24G4/SR1 24G4/SR2	J*
Silver	D96-12547	25B2/CS2	51	60-140	25B1/CS1 25B1/CS2 25B1/CS3 25B2/CS1 25B2/CS2 25B2/CS2D 25B2/CS3 25B3/CS1 25B3/CS2 25B3/CS3 25B4/CS1 25B4/CS2 25B4/CS3 25B5/CS1 25B5/CS2	J*
Mercury	D96-12650	25G1/SR1	71.3	75-125	25G1/SR1 25G2/SR1 25G2/SR1D 25G3/SR1 25G4/SR1	J*
Lead	D96-12650	25G1/SR1	141	75-125	25G1/SR1 25G2/SR1 25G2/SR1D 25G3/SR1 25G4/SR1	J*

SDG = Sample Delivery Group
REC = Percent Recovery
NC = No Conclusion
J* = Qualified as estimated during QC data review

Table 5-8
Organic Matrix Spike/Matrix Spike Duplicate Results
RFI Interim Measures
Armco Kansas City Facility

Parameter	SDG	Spike Sample	MS REC	MSD REC	REC Limits	RPD	RPD Limits	Associated Samples	Action Taken
TPH	D96-12131	24G2/SR1	496	191	30-150	88.5	25	24Ga/SR1	None
TPH	D96-12383	24G2/SR1	496	191	30-150	88.5	25	24G1/SR1 24G1/SR2 24G1/SR2D 24G2/SR2 24G3/SR1 24G3/SR2 24G4/SR1 24G4/SR2	None
TPH (batch AB925-70)	D96-12547	25B2/CS2	75.6	78	30-150	12800	25	25B1/CS1 25B1/CS2 25B1/CS3 25B2/CS1 25B2/CS1D 25B2/CS2 25B2/CS3 25B3/CS1 25B3/CS2 25B3/CS3 25B4/CS1 25B4/CS2 25B4/CS3 25B5/CS1 25B5/CS2 25B6/CS1 25B6/CS2 25B7/CS1 25B7/CS2 25B7/CS3 25B8/CS1 25B8/CS2 25B8/CS3	NC
TPH (batch 28-111396)	D96-12547	25B2/CS2	1.6	3.4	70-130	72	25	25B1/CS1 25B1/CS2 25B1/CS3 25B2/CS1 25B2/CS1D 25B2/CS2 25B2/CS3 25B3/CS1 25B3/CS2 25B3/CS3 25B4/CS1 25B4/CS2 25B4/CS3 25B5/CS1 25B5/CS2 25B6/CS1 25B6/CS2 25B7/CS1 25B7/CS2 25B7/CS3 25B8/CS1 25B8/CS2 25B8/CS3	None

Table 5-8 (continued)
Organic Matrix Spike/Matrix Spike Duplicate Results
RFI Interim Measures
Armco Kansas City Facility

Parameter	SDG	Spike Sample	MS REC	MSD REC	REC Limits	RPD	RPD Limits	Associated Samples	Action Taken
4-Nitrophenol	D96-12547	25B2/CS2	2.2	2.8	10-132	23.1	47	25B1/CS1	None
								25B1/CS2	
								25B1/CS3	
								25B2/CS1	
								25B2/CS1D	
								25B2/CS2	
								25B2/CS3	
								25B3/CS1	
								25B3/CS2	
								25B3/CS3	
								25B4/CS1	
								25B4/CS2	
								25B4/CS3	
								25B5/CS1	
								25B5/CS2	
								25B6/CS1	
								25B6/CS2	
								25B7/CS1	
								25B7/CS2	
								25B7/CS3	
								25B8/CS1	
								25B8/CS2	
								25B8/CS3	
Pentachlorophenol	D96-12547	25B2/CS2	2.7	3	14-176	11.9	49	25B1/CS1	None
								25B1/CS2	
								25B1/CS3	
								25B2/CS1	
								25B2/CS1D	
								25B2/CS2	
								25B2/CS3	
								25B3/CS1	
								25B3/CS2	
								25B3/CS3	
								25B4/CS1	
								25B4/CS2	
								25B4/CS3	
								25B5/CS1	
								25B5/CS2	
								25B6/CS1	
								25B6/CS2	
								25B7/CS1	
								25B7/CS2	
								25B7/CS3	
								25B8/CS1	
								25B8/CS2	
								25B8/CS3	

SDG = Sample Delivery Group
 RPD = Relative Percent Difference
 REC = Percent Recovery
 TPH = Total Petroleum Hydrocarbons
 NC = No Conclusion, spike was less than one-fourth the sample concentration

Table 5-9
Rinsate Blank Results
RFI Interim Measures
Armco Kansas City Facility

Sample Delivery Group	Rinsate Sample	Associated Samples	Parameters Qualified "F"
D96-12266	10G1/SR1R	10G1/SR1	Cadmium
		10G1/SR2	Cadmium
		10G4/SR1	Cadmium
		10G5/SR2	Cadmium
		10G2/SR1	Cadmium
		10G2/SR2D	Cadmium
		10G5/SR1	Cadmium
		10G6/SR1	Cadmium
		10G4/SR2	Cadmium
		10G6/SR2	Cadmium
		10G2/SR2	Cadmium
		10G3/SR1	Cadmium
		10G3/SR2	Cadmium
D96-12547	25B4/CS3R	25B1/CS1	Cadmium
		25B1/CS2	Cadmium
		25B1/CS3	Cadmium
		25B2/CS1	Cadmium
		25B2/CS2	Cadmium
		25B2/CS2D	Cadmium
		25B2/CS3	Cadmium
		25B3/CS1	Cadmium
		25B3/CS2	Cadmium
		25B3/CS3	Cadmium
		25B4/CS1	Cadmium
		25B4/CS2	Cadmium
		25B4/CS3	Cadmium
		25B5/CS1	Cadmium
	26B2/CS2R	25B5/CS2	Cadmium
		25B6/CS1	Cadmium
		25B6/CS2	Cadmium
		25B7/CS1	Cadmium
		25B7/CS2	Cadmium
		25B7/CS3	Cadmium
		25B8/CS1	Cadmium
		25B8/CS2	Cadmium
		25B8/CS3	Cadmium
		26B1/CS1	Cadmium
		26B1/CS2	Cadmium
		26B2/CS1	Cadmium
		26B2/CS1D	Cadmium
		26B2/CS2	Cadmium
D96-12650	25G4/SR1R	25G1/SR1	Cadmium, Chromium
		25G2/SR1	Cadmium, Chromium
		25G2/SR1D	Cadmium, Chromium
		25G3/SR1	Cadmium, Chromium
		25G4/SR1	Cadmium, Chromium
D96-12760	24T3/SB1R	24T3/SB1	Cadmium, Chromium, Lead
		24T3/SB2	Cadmium, Chromium, Lead
		24T1/SB1	Cadmium, Chromium, Lead
		24T1/SB2	Cadmium, Chromium, Lead
		24T1/SB2D	Cadmium, Chromium, Lead
		24T1/SB3	Cadmium, Chromium, Lead
		24T1/SB4	Cadmium, Chromium, Lead
		24T1/SB5	Cadmium, Chromium, Lead
		24T1/SB6	Cadmium, Chromium, Lead
		24T3/SB3	Chromium

Table 5-9 (continued)
Rinsate Blank Results
RFI Interim Measures
Armco Kansas City Facility

Sample Delivery Group	Rinsate Sample	Associated Samples	Parameters Qualified "F"
D96-12805	24T4/SB3R	24T2/SB1	Cadmium, Chromium
		24T2/SB2	Cadmium, Chromium
		24T2/SB3	Cadmium, Chromium
		24T4/SB1	Cadmium, Chromium
		24T4/SB2	Cadmium, Chromium
		24T4/SB3	Cadmium, Chromium
		24T5/SB1	Cadmium, Chromium
		24T5/SB2	Cadmium, Chromium
		24T5/SB3	Cadmium, Chromium
		24T6/SB1	Cadmium, Chromium
		24T6/SB2	Cadmium, Chromium
		24T6/SB2D	Cadmium, Chromium
		24T6/SB3	Cadmium, Chromium
		24T6/GW1	Cadmium, Chromium

6.0 REPRESENTATIVENESS

6.1 PRECISION AND ACCURACY

The precision and accuracy of chemical data obtained during the investigation are addressed in Sections 4.0 and 5.0 of this quality control evaluation (QCE) report. Data that was appended with qualifiers indicates problems encountered with QC that might have affected the ability of data to represent actual Site conditions.

6.2 HOLDING TIMES

All samples were extracted and analyzed within their required holding times

6.3 SAMPLING LOCATIONS AND ANALYTICAL PARAMETERS

The rationale for all sampling locations, detailed in the Interim Measures Plan, was primarily to allow for the determination of the presence and extent of contamination.

Subsurface soil and surface soil samples were analyzed for VOCs, SVOCs, RCRA Metals, TPH, PAH, pH, hexavalent chromium, and/or TCLP lead and cadmium using the protocols specified in SW-846. Groundwater samples were analyzed for VOCs, SVOCs, TPH, lead, trivalent chromium, and hexavalent chromium using the protocols specified in SW-846. The analytical parameters were chosen to best characterize potential contamination at the Facility.

6.4 SAMPLE PRESERVATION AND STORAGE

All samples were received by ITS between 2 and 6 degrees Celsius as required by SW-846.

* * * * *

7.0 COMPLETENESS

7.1 FIELD COMPLETENESS

Field completeness for sample collection is assessed by comparing the number of samples collected to the number of samples planned for collection, and is calculated as follows:

$$\% \text{ Completeness} = \frac{\text{Number of Samples Collected}}{\text{Number of Samples Planned for Collection}} \times 100$$

There were 52 field samples planned to be collected during the interim measures investigation activities, and 82 field samples were collected. Table 7-1 illustrates that there was over 100 percent field completeness for this sampling event.

7.2 LABORATORY COMPLETENESS

Laboratory completeness for usable data is assessed by comparing the number of valid sample results for each analyte to the number of samples submitted to the laboratory for each analysis, and is calculated as follows:

$$\% \text{ Completeness} = \frac{\text{Number of Sample Analysis Results Having Valid Data}}{\text{Number of Sample Analyses Requested}} \times 100$$

There were 82 field samples collected and submitted to the laboratory in which 324 total analyses were run. Only one subsurface soil analyses yielded unusable (R) data; therefore, the laboratory completeness for subsurface soil samples was 99.5 percent (see Table 7-1).

Table 7-1
Field and Laboratory Completeness

Sample Type	Field Completeness	Laboratory Completeness
Groundwater Samples	117 %	100 %
Surface Soil Samples	133 %	100 %
Subsurface Soil Samples	182 %	99.5 %

8.0 COMPARABILITY

8.1 ANALYTICAL METHODS

The following preparation and analytical methods were employed during the investigation:

Parameter	Preparation Method	Analysis Method
VOCs	Not Applicable (NA)	SW-846 Method 8260 & 8240
SVOCs	SW-846 Method 3550	SW-846 Method 8270
TPH	SW-846 Methods 3510 & 5030	SW-846 Method 8015
PAH	SW-846 Methods 3520 & 3550	SW-846 Method 8270
Silver, Arsenic, Barium, Cadmium, Chromium, Lead, Selenium	SW-846 Methods 3050 & 3005	SW-846 Method 6010
Hexavalent Chromium	NA	SW-846 Method 7196
Trivalent Chromium	NA	Calculation
Mercury	SW-846 Method 7471	SW-846 Method 7470 & 7471
TCLP	SW-846 Methods 1311 & 3015	SW-846 Method 6010
pH	NA	SW-856 Method 9045

SW-846 Method 8240, used in SDGs D96-14052 and D96-14212, was performed to analyze for VOCs “skinners list”, whereas SW-846 Method 8260 was used in all other SDG analyses for VOC parameters. SW-846 Methods 8240 and 8260 are essentially the same, including the column used. The difference between the two methods lies in the analyte list used for each respective method.

These methods apply to the analyses of both soil and water samples. The data obtained during this investigation are comparable to data analyzed by the same methods.

8.2 QUANTITATION LIMITS

Detection limits given on the ITS report originals are actually practical quantitation limits (PQLs) for organic analyses and reporting limits for inorganic analyses. These reporting limits and PQLs were spot-checked to see if appropriate corrections had been employed for moisture content, sample weight/volume, and dilutions. All checked items had been calculated correctly.

PQLs were raised for several TPH and PAH samples by dilution factors of 2 to 25 (see Table 8-1) in order to bring concentrations of target and non-target analytes into calibration range.

VOC PQLs were raised for one sample by a dilution factor of 100 (see Table 8-1) in order to bring concentrations of target and non-target analytes into calibration range.

* * * * *

Table 8-1
Dilution Factors
RFI Interim Measures
Armco Kansas City Facility

SDG	Sample	Parameter	Dilution Factor
D96-12131	24GA/SR1	All	20
D96-12266	10G5/SR1	Lead	5
	10G6/SR1	Lead	5
	10G6/SR2	Lead	5
	10G3/SR1	Lead	5
D96-12383	24G1/SR1	PAH	10
	24G1/SR2D	PAH	10
	24G2/SR1	PAH	10
	24G2/SR2	PAH	10
	24G3/SR1	PAH	10
	24G3/SR2	TPH	25
	24G4/SR2	PAH	10
D96-12547	25B1/CS1	TPH	2
	25B1/CS2	TPH	2
	25B2/CS1	TPH	2
	25B2/CS2	TPH	2
	25B2/CS2D	TPH	2
	25B3/CS3	TPH	2
	25B4/CS3	TPH	2
	25B5/CS1	TPH	2
	25B6/CS1	TPH	2
	25B6/CS2	TPH	2
	25B7/CS1	TPH	2
	25B7/CS3	TPH	2
	25B8/CS1	TPH	2
	25B2/CS2	PAH	10
	25B6/CS1	PAH	10
	25B6/CS2	PAH	10
	25B7/CS1	PAH	10
	25B8/CS3	TPH	5
D96-12650	25G1/SR1	TPH	5
	25G2/SR1	TPH	5
	25G3/SR1	TPH	5
	25G2/SR1	PAH	10
	25G2/SR1D	PAH	10
	25G3/SR1	PAH	10
D96-12760	24T1/SB1	TPH	25

SDG = Sample Delivery Group
TPH = Total Petroleum Hydrocarbons
PAH = Polynuclear Aromatic Hydrocarbons
VOC = Volatile Organic Compounds

9.0 CONCLUSIONS

This report presents the QC evaluation conducted on analytical data collected from October 29 through November 11, 1996, at the Facility. The investigation included the collection of subsurface soil, surface soil, and groundwater samples along with associated QC samples.

ITS provided the analytical services for this project. Laboratory QA/QC procedures followed SW-846 protocols.

BMWCI validated the data by reviewing the Level III items listed in Figures 1-1 and 1-2. Validation procedures are outlined in the USEPA's NFGO and NFGI.

The conclusion of this QC evaluation is that, with the exception of the VOC analyses for one sample being qualified as unusable (R), the data collected during this investigation are valid as qualified for use in representing Facility conditions.

* * * * *

APPENDIX C
DRILLING LOGS

Drilling Log

Project Name ARMCORFI		Project Number 94-498-4-003-02		Boring Number 12MW1	
Ground Elevation 733.3		Location N336469.21 E862815.21		Page 1 of 2	
Air Monitoring Equipment Micro Tip Photo Vac				Total Footage 26.0	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	8"	25.5	0.5	3	0
Drilling Company LAYNE INC.			Driller (s) R.BOWLES, C.REED		
Drilling Rig CME-75			Type of Sampler Split Spoon, CME, Shelby Tube		
Date 12/04/96		To 12/04/96		Field Observer (s) K.SIMMONS	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
1	SLAG GRAVEL, with silt, very dark gray (10YR3/1), moist to wet, well graded, fine to coarse grained slag gravel	GM		0.0/ 1.5						Start at 11:30
2	SILT, very dark gray (10YR3/1), moist, non plastic, very stiff	ML		2.0/ 2.0					0	
3	SILT, some sand, dark gray (5Y4/1), moist, very fine sand, poorly graded, non plastic, medium stiff									
4				0.0/ 1.5						
5										
6				1.7/ 2.0	12:00	ST1				
7	CLAY, with silt, dark gray (2.5Y4/1), moist to wet, very soft, high plasticity	CH								Pocket penetrometer = 0.5-1.0 TSF
8				3.0/ 3.0					0	
9										
10										
11										
12				2.0/ 5.0					0	
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

WASTE
CONSULTANTS
INC.

Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW1			
Project Number 94-498-4-003-02							Page 2 of 2			
							Date 12/04/96			
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
15	CLAY, with silt, dark gray (2.5Y4/1), moist to wet, very soft, very loose to loose, high plasticity, trace sandy seam from 16.3' to 16.4'	CH		2.0/ 5.0						
16				3.0/ 3.0				0		
17										
18										
19	SAND, some clay, dark gray (2.5Y4/1), wet, fine grained, poorly graded, trace very fine to coarse sand, loose	SP	5/ 4/ 1/ 2	2.0/ 2.0	12:35	SS1				
20	CLAY, with silt, dark gray (2.5Y4/1), moist to wet, very loose, very soft, high plasticity	CH								
21	SAND, some clay, dark gray (2.5Y4/1), wet, fine to very fine grained, poorly graded, loose, subangular to subrounded, quartz, trace feldspar, gravelly at 25' to 25.5'	SC		1.0/ 5.0						
22								0		
23										
24										
25										Dilled to 25', sampled to 26'
26	SHALE, medium gray (N5), wet, moderately weathered, very weak, fissile Total Depth 26.0 ft.	SH	15/ 50	1.0/ 1.0	13:15	SS2				Stopped drilling at 13:15
27										
28										
29										
30										
31										

BZ=Breathing Zone BH=Bore Hole S=Sample


B. H. H.	H. H. H.
Consultants	Inc.

Drilling Log

Project Name ARMCORFI			Project Number 94-498-4-003-02			Boring Number 12MW2		
Ground Elevation 733.2		Location N336866.41 E862807.01				Page 1 of 4		
Air Monitoring Equipment Micro Tip Photo Vac						Total Footage 53.5		
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes			
HSA	8"	53.0	0.5	0	0			
Drilling Company LAYNE INC.				Driller (s) R.BOWLES, C.REED				
Drilling Rig CME-75				Type of Sampler Split Spoon, CME				
Date 12/05/96		To 12/05/96		Field Observer (s) K.SIMMONS				

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
1	SLAG GRAVEL, with silt, very dark gray (10YR3/1), moist, well graded, fine to coarse grained slag gravel	GM		0.0/ 2.0		0.0/ 2.5				Start at 08:35
2	CLAY, with silt, very dark gray (10YR3/1), moist, trace to medium plasticity, stiff, trace organic material (plant fibers)	CL		0.2/ 3.0 CME1		2.5/ 2.5 CME2			0	Sampled first bore hole as CME-1 offset 6' south, redrilled to 25.5', relogged recovery as CME2
3										
4										
5	CLAY, with silt, dark grayish brown (10YR4/2), moist, medium to high plasticity, loose, soft to very soft, seams of wet silt at 11.2' and 11.6', trace wood fragments and glass, some rust colored staining	CH		0.2/ 5.0 CME1		2.0/ 5.0 CME2				Lead bit may be plugged
6										
7										
8										
9										
10	SILT, with clay, dark grayish brown (10YR4/2), moist to wet, trace to medium plasticity, loose, soft to very soft	ML		2/ 2/ 2/ 3		1.5/ 5.0 CME2			0	
11										
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample



Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW2			
Project Number 94-498-4-003-02							Page 2 of 4			
							Date 12/05/96			
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
15	SILT, with clay, dark grayish brown (10YR4/2), moist to wet, trace to medium plasticity, loose, soft, trace very fine sand seams	ML		1.0/ 3.0 CME1		1.5/ 5.0 CME2				
16			1/ 0/ 1/1	2.0/ 2.0				0		
17	SILT, some sand and clay, dark gray (10YR4/1), wet, very loose, soft, trace plasticity, thin bedded, sand is very fine, poorly graded,									
18			1/ 0/ 1/0	1.5/ 2.0				0		
19										
20			2/ 3/ 4/3	1.4/ 2.0				0		
21	SILT, with sand, trace clay, dark gray (10YR4/1), wet, very loose, very soft, trace to non plastic, thin bedded, grades to very fine, poorly graded sand	SM								
22			2/ 1/ 2/3	1.6/ 2.0				0		
23										
24	SILT, some clay, trace sand seams, dark gray (10YR4/1), wet, loose, trace to medium plasticity, thin bedded, grades to fine, poorly graded sand		2/ 4/ 8/11	2.0/ 2.0				0		
25										
26	SAND, some silt, dark gray (5Y4/1), wet, fine to very fine grained, poorly graded, medium density		3/ 5/ 6/7	1.5/ 2.0				0		
27										
28			2/ 5/ 7/8	2.0/ 2.0				0		
29										
30			2/ 2/ 2/1	2.0/ 2.0						
31										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW2			
Project Number 94-498-4-003-02							Page 3 of 4			
							Date 12/05/96			
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
32	SAND, some silt, dark gray (5Y4/1), wet, fine to very fine grained, poorly graded, medium to loose, trace fine gravel below 35'	SM	2/ 5/ 8/ 15	2.0/ 2.0						
33										
34			2/ 2/ 2/ 5	1.6/ 2.0						
35										
36	5/ 6/ 6/ 7	2.0/ 2.0								
37										
38	SAND, trace silt, dark gray (5Y4/1), wet, fine to very fine grained, poorly graded, medium to loose, trace fine gravel, trace medium grain sand	SP	2/ 5/ 11/ 20	2.0/ 2.0						
39										
40			6/ 8/ 11/ 6	2.0/ 2.0						
41										
42			4/ 2/ 3/ 7	2.0/ 2.0						
43									Discontinued sampling due to sand heave	
44										
45										
46										
47										
48										

BZ=Breathing Zone BH=Bore Hole S=Sample

Drilling	Waste
Consultants	Inc.

Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW2			
Project Number 94-498-4-003-02							Page 4 of 4			
Date 12/05/96										
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
49	SAND, trace silt, dark gray (5Y4/1), wet, fine to very fine grained, poorly graded, medium to loose, trace fine gravel, some medium to coarse grained sand	SP								
50										
51										
52										
53	SHALE, bedrock	SH								drilling harder at 53', refusal at 53.5'
54	Total Depth 53.5 ft.									Stopped drilling at 53.5' backfilled with bentonite, offset 6' south to redrill. will resample upper 15' due to poor recovery.
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										

BZ=Breathing Zone BH=Bore Hole S=Sample

Waste Consultants, Inc.

Drilling Log

Project Name ARMCORFI		Project Number 94-498-4-003-02		Boring Number 12MW3	
Ground Elevation 732.9		Location N337104.19 E863108.07		Page 1 of 2	
Air Monitoring Equipment OVM 580B				Total Footage 23.5	
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes
HSA	8"	23.5	0	4	0
Drilling Company LAYNE INC.			Driller (s) R.BOWLES, C.REED		
Drilling Rig CME-75			Type of Sampler Split Spoon, CME, Shelby Tube		
Date 12/06/96		To 12/06/96		Field Observer (s) K.SIMMONS	

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
1	SLAG GRAVEL, some silt and clay, dark gray (10YR4/1), moist, fine gravel, poorly graded	GM		0.0/ 1.5						Start at 14:10
2	CLAY, with silt, very dark gray (10YR3/1), moist, hard, trace to medium plasticity	CL		1.0/ 2.5					0	
3										
4										
5				2.0/ 2.0	14:15	ST1				Sampled ST1
6	CLAY, some silt, dark grayish brown (10YR4/2), moist, medium to high plasticity, hard to stiff	CH		1.5/ 2.0					0	Pockett penetrometer = >4.0 TSF
7										
8										
9				2.0/ 2.0	14:35	ST2				Sampled ST2
10										Pockett penetrometer = 1.75 TSF
11	CLAY, some sand, dark grayish brown (10YR4/2), wet, trace plasticity, trace to some clay seams; sand is very fine grained, poorly graded	CL		2.9/ 4.0					0	
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Waste
Consultants
Inc.

Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW3			
Project Number 94-498-4-003-02							Page 2 of 2			
							Date 12/06/96			
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
15	SAND, some clay and silt, dark gray (5Y4/1), wet, fine to coarse grained, moderately well graded, seam of silty clay, odor	SC		1.0/ 5.0	15:00	CS1				Sampled CS1
16										
17										
18	SAND, with silt, dark gray (5Y4/1), wet, very fine grained, poorly graded, very loose, very soft, thin bedded, clayey seams	SM	0/ 0/ 0/ 0	2.0/ 2.0	15:10	SS1				Sampled SS1
19										
20										
21	CLAY, gray (N5), wet, high plasticity, very soft, very loose, thin bedded, odor	CH	2/ 1/ 1/ 1	2.0/ 2.0						Stopped drilling @ 23.5 Ft. BGS
22										
23										
24	Total Depth 23.5 ft.									
25										
26										
27										
28										
29										
30										
31										

BZ=Breathing Zone BH=Bore Hole S=Sample

B. J. J. West
Consultants
Inc.

Drilling Log

Project Name ARMCORFI		Project Number 94-498-4-003-02		Boring Number 12MW4						
Ground Elevation 738.8		Location N336627.82 E863239.11		Page 1 of 3						
Air Monitoring Equipment MICRO TIP PHOTO VAC				Total Footage 32.0						
Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. Of Samples	No. Of Core Boxes					
HSA	8"	32.0	0	2	0					
Drilling Company LAYNE INC.			Driller (s) R.BOWLES, C.REED							
Drilling Rig CME-75			Type of Sampler Split Spoon, CME							
Date 12/06/96		To 12/06/96		Field Observer (s) K.SIMMONS						
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
1	SILT, with clay, dark grayish brown (10YR4/2), moist, trace to medium plasticity, stiff, plant material (wood)	ML		3.6/ 5.0						Start at 08:30
2										
3										
4										
5										
6										
7	CLAY, with silt, dark gray (10YR4/1), moist, high to medium plasticity, stiff, trace wood fragments, odor	CH	3.2/ 5.0			CS1				Sampled CS1
8	SILT, some clay, dark gray (10YR4/1), moist, trace plasticity, stiff, odor, clay seam from 10.8' to 11.0'	ML								
9										
10	CLAY, some silt, dark gray (10YR4/1), moist to wet, high plasticity, medium to stiff		4.2/ 5.0				0	24	0	
11										
12										
13	SILT, trace sand and clay, dark gray (10YR4/1), wet, trace to non plastic, very soft to soft, loose to very loose, trace sand seams and clay seams	CH								
14	ML									

BZ=Breathing Zone

BH=Bore Hole

S=Sample

Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW4			
Project Number 94-498-4-003-02							Page 2 of 3			
							Date 12/06/96			
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
15	SILT, trace sand and clay, dark gray (10YR4/1), wet, trace to non plastic, very soft to soft, loose to very loose, trace sand seams and clay seams	ML		4.2/ 5.0						Sampled CS2
16						CS2				
17										
18				1.5/ 5.0						
19										
20	CLAY, with silt, trace sand, dark gray (10YR4/1), wet, medium plasticity, very loose, with high plasticity seams, trace gravel at 20.5'	CL/ CH					3	62		PID not working
21				4/ 2/ 2/ 2	1.4/ 2.0					
22	SAND, trace silt, dark gray (5Y4/1), wet, very fine to coarse grained, moderate to well graded, medium density, trace clay seams, trace coal, trace pebbles	SP								
23				3/ 3/ 11/ 9	2.0/ 2.0					
24		SW								
25				8/ 10/ 8/ 12	1.8/ 2.0					
26										
27			3/ 3/ 6/ 9	2.0/ 2.0						
28										
29										
30										
31										
										Drilled to 30', sampled to 32'

BZ=Breathing Zone BH=Bore Hole S=Sample

Borehole Waste
Consultants
Inc.

Drilling Log Continuation

Project Name ARMCORFI							Boring Number 12MW4			
Project Number 94-498-4-003-02							Page 3 of 3			
							Date 12/06/96			
Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm)			Remarks/ Water Levels
							BZ	BH	S	
32	Shale, light gray (N7), limestone gravel at top of bedrock, limestone is oolitic and micritic, dusky yellow (5Y6/4) Total Depth 32.0 ft.	SH	5/ 8/ 22/ 35	0.0/ 2.0						Stopped drilling, sampler stuck in auger pulled auger to retrieve sampler. Hole collapse to 20', WL. at 19.3' BGS. Redrilled to 28.2' to set well.
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
44										
45										
46										
47										
48										

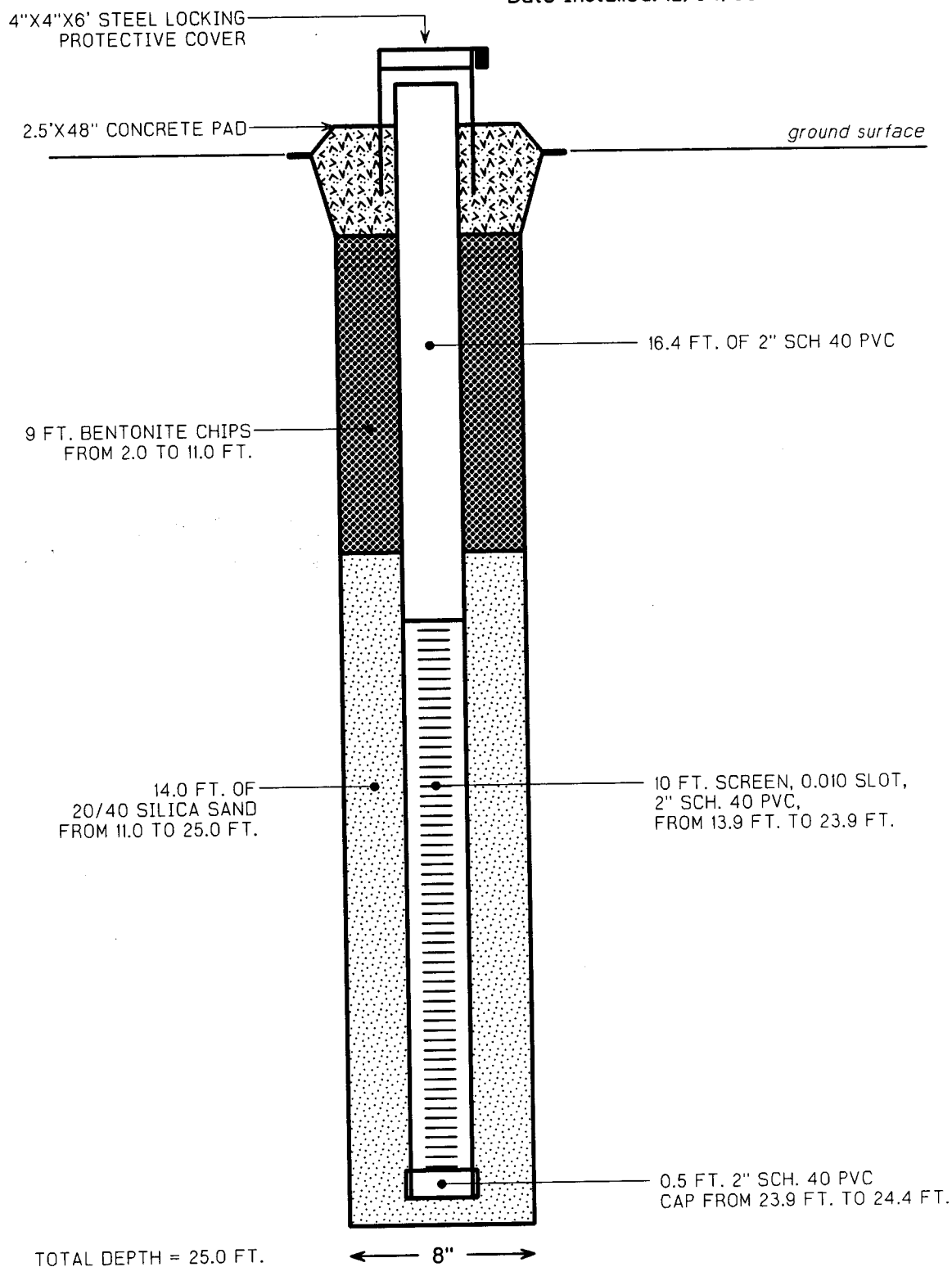
BZ=Breathing Zone BH=Bore Hole S=Sample

Borehole	Waste
A	Consultants
H. Daniels	Inc.

APPENDIX D
MONITORING WELL CONSTRUCTION DIAGRAMS

Project Name: ARMCORFI
Project Number: 94-498-4-003-02

Ground Surface Elevation: 733.3
Top of Casing Elevation: 735.83
Date Installed: 12/04/96



TOTAL DEPTH = 25.0 FT.

8"

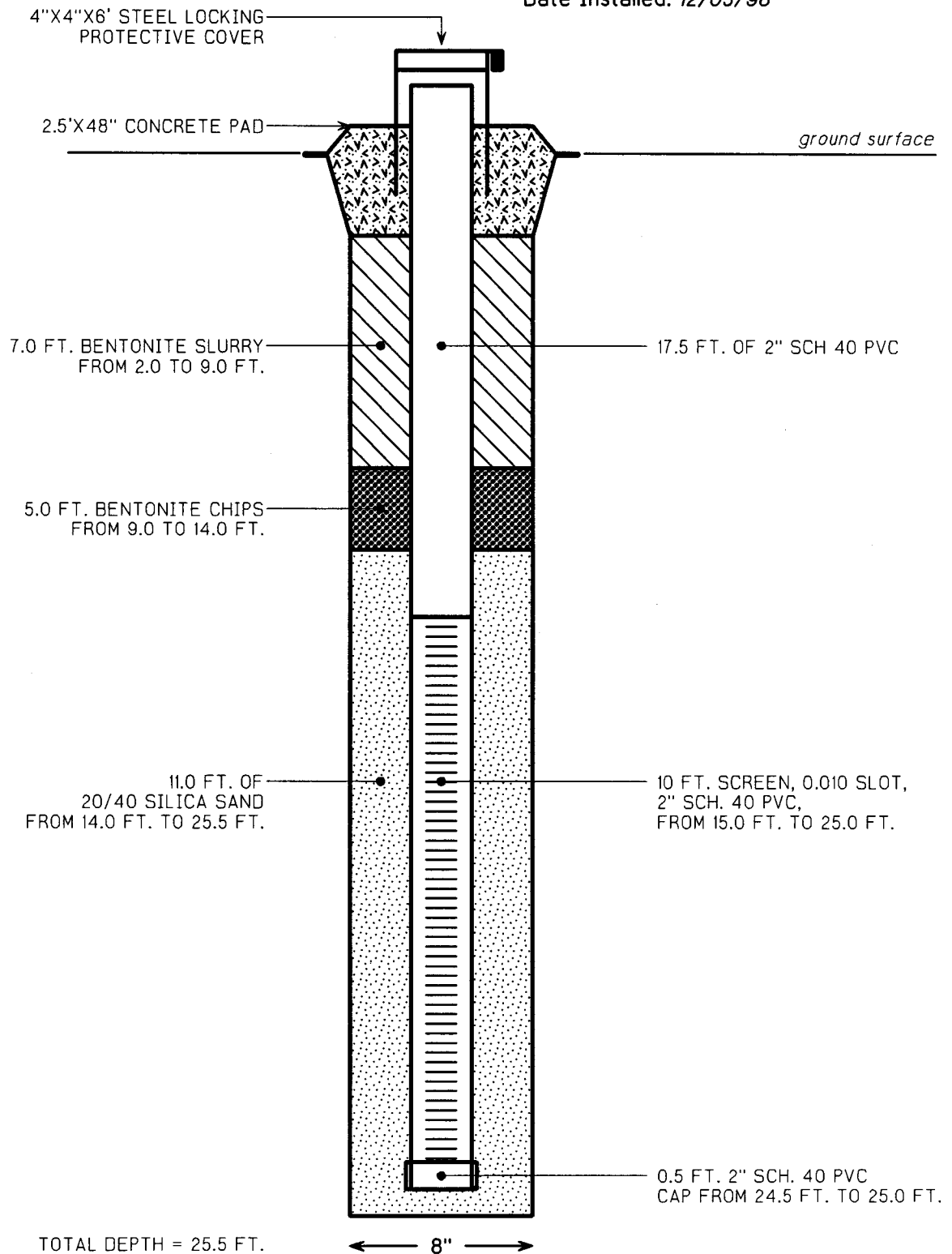
NOT TO SCALE

Burns
&
McDonnell
Waste
Consultants,
Inc.

MONITORING WELL
CONSTRUCTION DIAGRAM
FOR 12MW1

Project Name: ARMCORFI
Project Number: 94-498-4-003-02

Ground Surface Elevation: 733.2
Top of Casing Elevation: 735.67
Date Installed: 12/05/96



TOTAL DEPTH = 25.5 FT.

8"

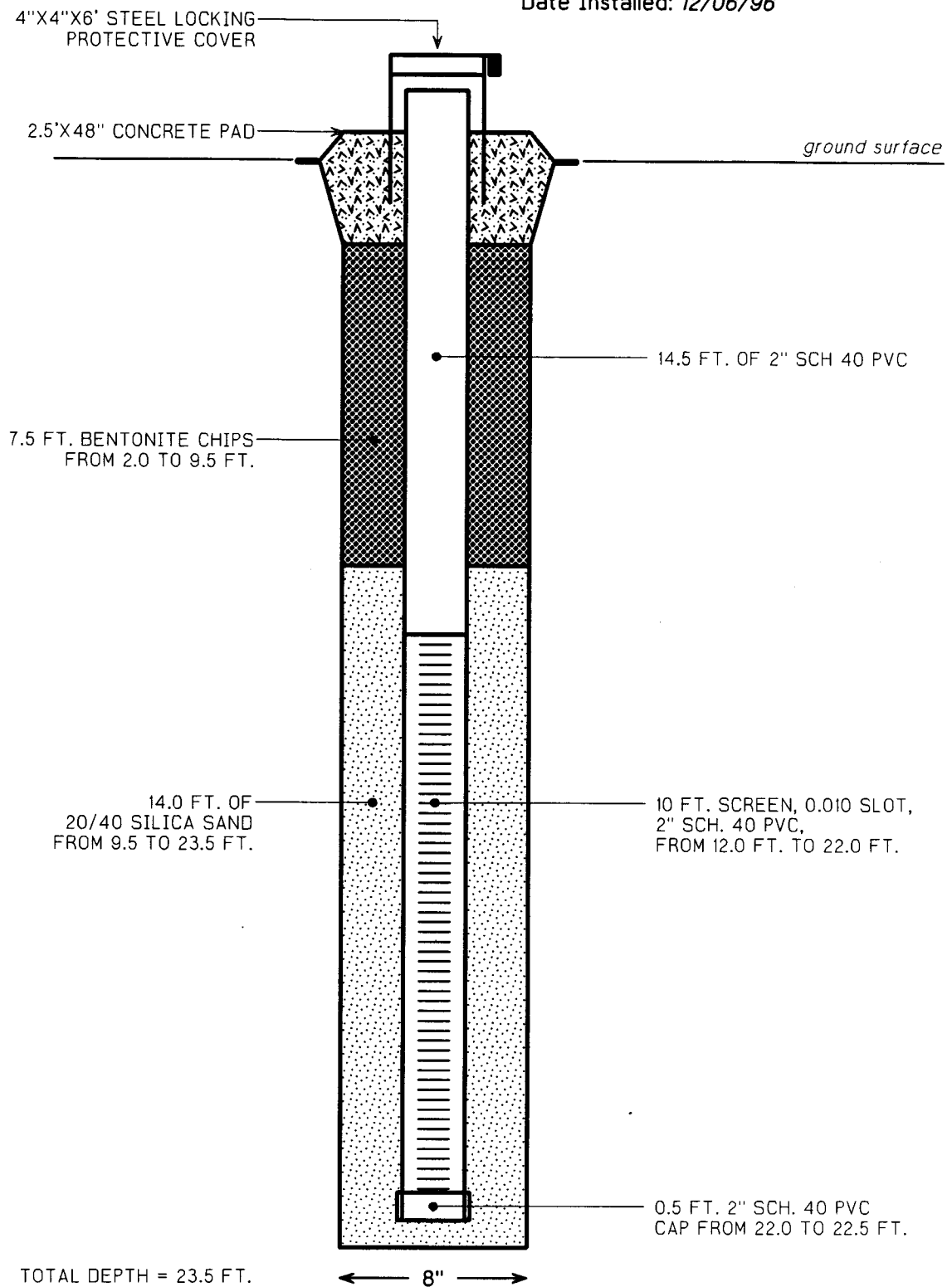
NOT TO SCALE

Burns
&
McDonnell
Waste
Consultants,
Inc.

MONITORING WELL
CONSTRUCTION DIAGRAM
FOR 12MW2

Project Name: ARMCORF1
Project Number: 94-498-4-003-02

Ground Surface Elevation: 732.9
Top of Casing Elevation: 735.58
Date Installed: 12/06/96



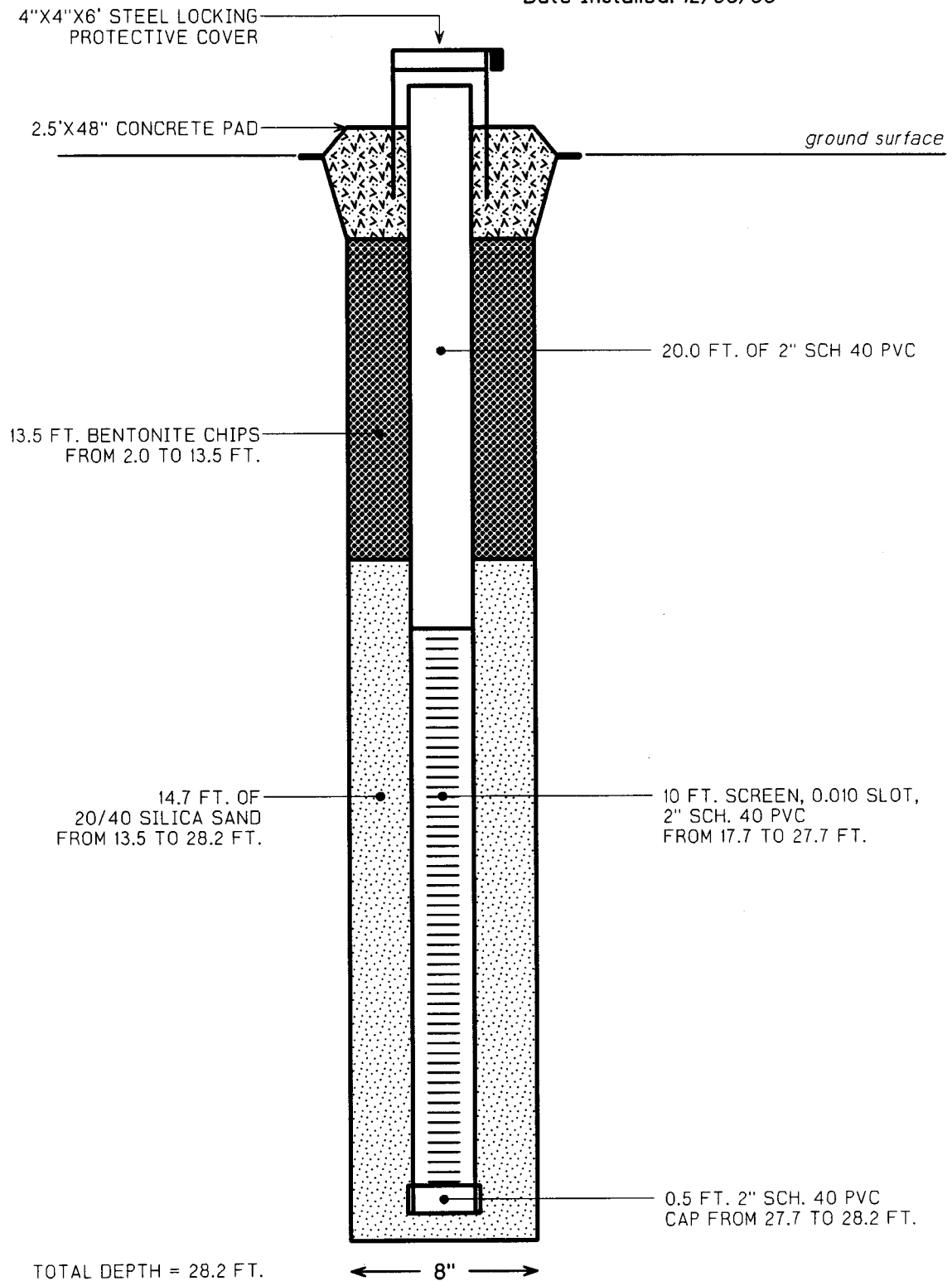
NOT TO SCALE

Burns
&
McDonnell
Waste
Consultants,
Inc.

MONITORING WELL
CONSTRUCTION DIAGRAM
FOR 12MW3

Project Name: ARMCORFI
Project Number: 94-498-4-003-02

Ground Surface Elevation: 738.8
Top of Casing Elevation: 740.90
Date Installed: 12/06/96



TOTAL DEPTH = 28.2 FT.

8"

NOT TO SCALE

Burns
&
McDonnell
Waste
Consultants,
Inc.

MONITORING WELL
CONSTRUCTION DIAGRAM
FOR 12MW4

APPENDIX E

MDNR MONITORING WELL CERTIFICATION RECORDS



MISSOURI DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF GEOLOGY AND
LAND SURVEY
**MONITORING WELL
CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED	
REF. NO.	146364		
C.R. NO.		CHECK NO.	
STATE WELL NUMBER		TRANSMITTAL NO.	
CHECKED BY		ROUTE	
APPROVED BY		ENTERED	
		Ph 1	Ph 2 Ph 3

INFORMATION SUPPLIED BY MONITORING WELL CONTRACTOR			
SITE/FACILITY NAME Swmu 12 / ARMC0		WELL NUMBER 12mw1	
SITE ADDRESS 7000 Roberts STREET		CITY KANSAS CITY	STATE MO ZIP CODE 64125
OWNER NAME ARMCO, INC. - Mr. MYRL WEAR		TELEPHONE (816) 242-5855	
OWNER ADDRESS 7000 Roberts Street		CITY KANSAS CITY	STATE MO ZIP CODE 64125
VARIANCE <input type="checkbox"/> YES ISSUED <input checked="" type="checkbox"/> NO	DATE ISSUED NA VARIANCE NUMBER: V NA	LOCATION OF WELL SHOW LOCATION IN SECTION PLAT COUNTY JACKSON SURFACE ELEVATION 733.3	
DESCRIBE LOCATION OF THE WELL SO WE WOULD BE ABLE TO VISIT IT Proceed East on Gravel Road south of Blue River at I-435 for 1.1 miles, Turn South on Gravel Road, Proceed South for c. 0.2 miles		SMALLEST 1/4 LARGEST 1/4 SEC. 29 TWN 50 N. R. 32 E. OR (W)	
		LAT. _____ LONG. _____	

MONITORING WELL INSTALLATION		PERMIT NUMBER	002321 PM
CONTRACTOR'S NAME Kenneth Simmons		PERMIT NUMBER	002497 WPM
DRILLING CONTRACTOR'S NAME Rusty Bowles			

WELL CONSTRUCTION INFORMATION							
TYPE OF WELL <input checked="" type="checkbox"/> MONITORING WELL <input type="checkbox"/> PIEZOMETER <input type="checkbox"/> OTHER	TYPE OF POTENTIAL SITE <input type="checkbox"/> HAZARDOUS MATERIAL <input type="checkbox"/> LANDFILL <input type="checkbox"/> OTHER <input checked="" type="checkbox"/> L.U.S.T. Former Sludge Pond	MONITORING FOR: (CHECK ALL THAT APPLY) <input checked="" type="checkbox"/> V.O.C. <input checked="" type="checkbox"/> METALS <input checked="" type="checkbox"/> PETROLEUM PRODUCT <input checked="" type="checkbox"/> OTHER SWAG ONLY					
PROTECTIVE CASING DETAILS (IF USED) LENGTH 5 FT. DIAMETER OF CASING 4 IN. WEIGHT OR SDR # NA	DIAMETER AND DEPTH OF DRILL HOLE 48 IN. 2 FT.	JOINTS <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED <input checked="" type="checkbox"/> OTHER NONE	THREADED <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED	MATERIAL <input checked="" type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER	LOCKING CAP? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	DESCRIBE HOW THE FLUSH MOUNT WAS CONSTRUCTED	
CAP VENTED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO WEEP HOLE? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	CASING GROUT DETAILS <input type="checkbox"/> CEMENT <input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER	DEPTH FROM THE SURFACE TO THE BOTTOM OF THE CASING GROUT SEAL 2 FT.	TYPE OF SURFACE COMPLETION <input checked="" type="checkbox"/> ABOVE GROUND <input type="checkbox"/> FLUSH MOUNT				
CENTRALIZER USED ON RISER <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	LOCATED AT			MATERIAL <input type="checkbox"/> STAINLESS STEEL <input type="checkbox"/> OTHER			
RISER PIPE DETAILS LENGTH 16.4 FT. DIAMETER OF RISER PIPE 2 IN. WEIGHT OR SDR # 54.40	DIAMETER OF DRILL HOLE 8 IN.	JOINTS <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED <input type="checkbox"/> OTHER	THREADED <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED	MATERIAL <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER <input type="checkbox"/> OTHER	THERMO PLASTIC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER		
ANNULAR SEAL <input type="checkbox"/> CEMENT SLURRY <input type="checkbox"/> BENTONITE SLURRY <input checked="" type="checkbox"/> NON SLURRY BENTONITE TYPE: Hole Plug Chips	<input type="checkbox"/> CEMENT/BENTONITE SLURRY BAGS OF CEMENT USED % BENTONITE USED WATER USED/BAG GAL	BENTONITE SEAL <input type="checkbox"/> SLURRY <input checked="" type="checkbox"/> CHIPS <input type="checkbox"/> GRANULAR <input type="checkbox"/> PELLETS	LENGTH OF SEAL 9 FT.	BENTONITE SEAL INSTALLED IN <input checked="" type="checkbox"/> UNSATURATED ZONE <input type="checkbox"/> SATURATED ZONE			
PRIMARY FILTER PACK TYPE <input checked="" type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input type="checkbox"/> NATURAL	GRAIN SIZE 20/40	LENGTH OF FILTER PACK 14 FT.	METHOD OF INSTALLATION Pour through Hollow Stem Augers	Information in this column to be supplied in the Feet from Surface column	FEET FROM SURFACE 2	FORMATION DESCRIPTION 0-1.6' SLAG GRAVEL 1.6-7' SILT	
SECONDARY FILTER PACK TYPE <input type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input checked="" type="checkbox"/> NONE	GRAIN SIZE	LENGTH OF FILTER PACK	METHOD OF INSTALLATION	Depth to bottom of Protective Casing Seal:	2	7-18.6' CLAY, with SILT Highly Plastic	
WELL SCREEN LENGTH OF SCREEN 10 FT. DIAMETER 2 IN. SLOT SIZE 0.010 WEIGHT OR SDR # 54.40			MATERIAL <input checked="" type="checkbox"/> PLASTIC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER	Depth to Base of Annular Seal:	11	18.6-19.2' SAND, Some Clay, Poorly graded 19.2-20' clay with SILT	
SUMP DETAILS LENGTH OF SUMP 0.5 FT. DIAMETER OF SUMP 2 IN.			MATERIAL <input checked="" type="checkbox"/> PVC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER <input type="checkbox"/> OTHER	Depth to Base of Bentonite Seal:	11	20'-25.5' SAND, fine to very fine, poorly graded	
BACK FILL WAS THE WELL BACK FILLED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	MATERIAL USED 20/40 SAND	LENGTH OF BACK FILLED BORE HOLE 1 foot		Depth to Top of Primary Filter Pack:	11	25.5'-26' SHALE	
STATIC WATER LEVEL 15.94 FEET FROM MEASURING POINT		MULTIPLE CASED WELLS SUBMIT ADDITIONAL AS BUILT DIAGRAM SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE AND SIZE OF ALL CASING, HOLE DIAMETERS, AND GROUT USED.					
DATE OF STATIC WATER LEVEL 12/11/96		DRILLING EQUIPMENT <input type="checkbox"/> AIR ROTARY <input checked="" type="checkbox"/> AUGER TYPE Hollow Stem					
MEASURING POINT FOR STATIC WATER LEVEL IS <input checked="" type="checkbox"/> TOP OF RISER PIPE <input type="checkbox"/> OTHER		<input type="checkbox"/> REVERSE <input type="checkbox"/> OTHER					
ELEVATION OF MEASURING POINT 735.83		DATE WELL DRILLING WAS COMPLETED 1/9/97					
		Total Depth: Drilled to 25 FT. Sampled to 26 FT.					

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.

SIGNATURE PRIMARY CONTRACTOR/PERMIT # Kenneth Simmons 002321 PM	DATE 2/19/97	SIGNATURE DRILLER/PERMIT # Rusty Bowles 002497 WPM	DATE 2-7-97
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MO 780-1415 (7-95)

DISTRIBUTION: WHITE/DIVISION CANARY/MONITORING WELL CONTRACTOR PINK/OWNER
MAIL WHITE COPY TO: DEPARTMENT OF NATURAL RESOURCES, P.O. BOX 250, ROLLA, MO 65402
ENCLOSE \$35 PER MONITORING WELL FOR THE CERTIFICATION FEE WITHIN 60 DAYS AFTER WELL COMPLETION

RECEIVED



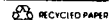
MISSOURI DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF GEOLOGY AND
LAND SURVEY
**MONITORING WELL
CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED	
REF. NO.	146365		
C.R. NO.		CHECK NO.	
STATE WELL NUMBER		TRANSMITTAL NO.	
CHECKED BY		ROUTE	
APPROVED BY		ENTERED	

INFORMATION SUPPLIED BY MONITORING WELL CONTRACTOR										
SITE/FACILITY NAME SWMU 12/ARMCO					WELL NUMBER 12 MW 2					
SITE ADDRESS 7000 Roberts Street				CITY KANSAS CITY		STATE MO		ZIP CODE 64125		
OWNER NAME ARMCO, INC. - Mr. MYRL WEAR					TELEPHONE (816) 242-5855					
OWNER ADDRESS 7000 Roberts Street				CITY KANSAS CITY		STATE MO		ZIP CODE 64125		
VARIANCE ISSUED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		DATE ISSUED 1/6/97		VARIANCE NUMBER V 633		LOCATION OF WELL SHOW LOCATION IN SECTION PLAT				
DESCRIBE LOCATION OF THE WELL SO WE WOULD BE ABLE TO VISIT IT Proceed East on Gravel Road South of Blue River at 1435 for 1.1 mile, Turn South on Gravel Road, Proceed South 0.2 miles						COUNTY JACKSON				
						SURFACE ELEVATION 733.2				
						SMALLEST 1/4 NW 1/4 SE 1/4 SW 1/4 SE 1/4				
						SEC. 29 TWN. 50 N. R. 32 E. OF W				
						LAT. _____ LONG. _____				
MONITORING WELL INSTALLATION										
CONTRACTOR'S NAME Kenneth Siemens					PERMIT NUMBER 002321 PM					
DRILLING CONTRACTOR'S NAME Rusty Bowles					PERMIT NUMBER 002497 WPM					
WELL CONSTRUCTION INFORMATION										
TYPE OF WELL <input checked="" type="checkbox"/> MONITORING WELL <input type="checkbox"/> PIEZOMETER <input type="checkbox"/> OTHER		TYPE OF POTENTIAL SITE <input type="checkbox"/> HAZARDOUS MATERIAL <input type="checkbox"/> LANDFILL <input type="checkbox"/> L.U.S.T. Former Sludge Pond		MONITORING FOR: (CHECK ALL THAT APPLY) <input checked="" type="checkbox"/> V.O.C. <input checked="" type="checkbox"/> METALS <input checked="" type="checkbox"/> PETROLEUM PRODUCT <input checked="" type="checkbox"/> OTHER S.V.C. ONLY						
PROTECTIVE CASING DETAILS (IF USED) LENGTH 5 FT.		DIAMETER OF CASING 4 IN.		WEIGHT OR SDR # NA		DIAMETER AND DEPTH OF DRILL HOLE 48 IN. 2 FT.		JOINTS <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED <input checked="" type="checkbox"/> OTHER NONE		
CAP VENTED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		WEEP HOLE? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		CASING GROUT DETAILS MATERIAL <input checked="" type="checkbox"/> CEMENT <input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER		DEPTH FROM THE SURFACE TO THE BOTTOM OF THE CASING GROUT SEAL 2 FT.		TYPE OF SURFACE COMPLETION <input checked="" type="checkbox"/> ABOVE GROUND <input type="checkbox"/> FLUSH MOUNT		
CENTRALIZER USED ON RISER <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		LOCATED AT		MATERIAL <input type="checkbox"/> STAINLESS STEEL <input type="checkbox"/> OTHER		DESCRIBE HOW THE FLUSH MOUNT WAS CONSTRUCTED				
RISER PIPE DETAILS LENGTH 17.5 FT.		DIAMETER OF RISER PIPE 2 IN.		WEIGHT OR SDR # SCH. 40		DIAMETER OF DRILL HOLE 8 IN.		JOINTS <input checked="" type="checkbox"/> THREADED <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED <input type="checkbox"/> OTHER		
ANNULAR SEAL <input type="checkbox"/> CEMENT SLURRY <input checked="" type="checkbox"/> BENTONITE SLURRY <input type="checkbox"/> NON SLURRY BENTONITE TYPE:		CEMENT/BENTONITE SLURRY BAGS OF CEMENT USED % BENTONITE USED WATER USED/BAG GAL.		BENTONITE SEAL MATERIAL <input type="checkbox"/> BENTONITE <input checked="" type="checkbox"/> SLURRY <input type="checkbox"/> GRANULAR <input type="checkbox"/> PELLETS		LENGTH OF SEAL 12 FT.		BENTONITE SEAL INSTALLED IN <input checked="" type="checkbox"/> UNSATURATED ZONE <input type="checkbox"/> SATURATED ZONE		
PRIMARY FILTER PACK TYPE <input checked="" type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input type="checkbox"/> NATURAL		GRAIN SIZE 20/40		LENGTH OF FILTER PACK 11 FT.		METHOD OF INSTALLATION Pour through Hollow Stem Augers		Information in this column to be supplied in the Feet from Surface column		
SECONDARY FILTER PACK TYPE <input type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input checked="" type="checkbox"/> NONE		GRAIN SIZE		LENGTH OF FILTER PACK		METHOD OF INSTALLATION		Depth to bottom of Protective Casing Seal: 2.0		
WELL SCREEN LENGTH OF SCREEN 10 FT.		DIAMETER 2 IN.		SLOT SIZE 0.010		WEIGHT OR SDR # SCH. 40		MATERIAL <input checked="" type="checkbox"/> PLASTIC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER		
SUMP DETAILS LENGTH OF SUMP 0.5 FT.		DIAMETER OF SUMP 2 IN.		MATERIAL <input checked="" type="checkbox"/> PVC <input type="checkbox"/> FLUORO POLYMER <input type="checkbox"/> OTHER		Depth to Base of Annular Seal: 9.0		2'-12' Clay, with Silt		
BACK FILL WAS THE WELL BACK FILLED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		MATERIAL USED		LENGTH OF BACK FILLED BORE HOLE		Depth to Base of Bentonite Seal: 14.0		12'-24.6' SILT, with clay AND SAND		
STATIC WATER LEVEL 17.30		FEET FROM MEASURING POINT		MULTIPLE CASED WELLS		Depth to Top of the Screen: 14.5		24.6'-25' SAND, trace silt, fine to very fine, poorly graded		
DATE OF STATIC WATER LEVEL 12/11/96		SUBMIT ADDITIONAL AS BUILT DIAGRAM SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE AND SIZE OF ALL CASING, HOLE DIAMETERS, AND GROUT USED.		DRILLING EQUIPMENT <input type="checkbox"/> AIR ROTARY <input checked="" type="checkbox"/> AUGER TYPE Hollow Stem		Depth to Bottom of the Screen: 24.5		Total Depth: 25 FT.		
MEASURING POINT FOR STATIC WATER LEVEL IS <input checked="" type="checkbox"/> TOP OF RISER PIPE <input type="checkbox"/> OTHER		ELEVATION OF MEASURING POINT 735.67		REVERSE ROTARY		DATE WELL DRILLING WAS COMPLETED 1/9/97				
I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.										
SIGNATURE PRIMARY CONTRACTOR/PERMIT # Kenneth Siemens 002321 PM					DATE 2/1/97		SIGNATURE DRILLER/PERMIT # Rusty Bowles 002497 WPM		DATE 2-7-97	

MO 780-1415 (7-95)

DISTRIBUTION: WHITE/DIVISION CANARY/MONITORING WELL CONTRACTOR PINK/OWNER
MAIL WHITE COPY TO: DEPARTMENT OF NATURAL RESOURCES, P.O. BOX 250, ROLLA, MO 65402
ENCLOSE \$35 PER MONITORING WELL FOR THE CERTIFICATION FEE WITHIN 60 DAYS AFTER WELL COMPLETION





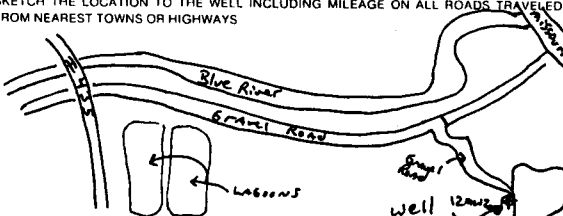
MISSOURI DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF GEOLOGY AND
LAND SURVEY
REGISTRATION RECORD

OFFICE USE ONLY		DATE RECEIVED	
REF NO	130412		
ROUTE		PWS NUMBER	CHECK NUMBER
STATE WELL NUMBER		TRANSMITTAL NO.	
CHECKED BY		CROSS REFERENCE NO.	
APPROVED BY	DATE	ENTERED	
		Ph 1	Ph 2 Ph 3

INFORMATION SUPPLIED BY OWNER

NAME ARMCO, INC - Mr. Myrl Wear		TELEPHONE 816-242-5855	
ADDRESS 7000 Roberts Street	CITY Kansas City	STATE Missouri	ZIP CODE 64125
SITE NAME SWMU 12 / ARMCO	WELL NUMBER 12MW2	ADDRESS OF WELL SITE OR SITE NAME (IF DIFFERENT THAN ABOVE)	
OWNER STATUS <input type="checkbox"/> BUILDER <input type="checkbox"/> PRIVATE HOME OWNER <input type="checkbox"/> DEVELOPER <input checked="" type="checkbox"/> OTHER (SPECIFY) Corporation	CITY	STATE	ZIP CODE
PURPOSE OF REGISTRATION FORM <input checked="" type="checkbox"/> ABANDONED WELL <input type="checkbox"/> MINERAL EXPLORATORY <input type="checkbox"/> WELL RECONSTRUCTION TEST HOLE <input type="checkbox"/> OTHER	VARIANCE ISSUED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	VARIANCE NUMBER	WELL CERTIFICATION NUMBER
DATE ORIGINALLY DRILLED		SIGNATURE (WELL OWNER)	

INFORMATION SUPPLIED BY CONTRACTOR

SKETCH THE LOCATION TO THE WELL INCLUDING MILEAGE ON ALL ROADS TRAVELED FROM NEAREST TOWNS OR HIGHWAYS		LOCATION OF WELL SHOW LOCATION IN SECTION PLAT	
		QUAD 733-2	COUNTY Jackson
		ELEV 733-2	AREA NO.
		SMALLEST 1/4 NW 1/4 SE 1/4 SW 1/4 SE 1/4	LARGEST 1/4
		SEC. 29	TWN. 50 N. RING. 32 E OR W
LAT. _____ LONG. _____			
DESCRIBE LOCATION OF THE WELL SO WE WOULD BE ABLE TO VISIT THE WELL Proceed East on Gravel Road South of 2435 and Blue River for 1.1 miles., Turn South on Gravel Road, Proceed for 0.2 miles			

CONTRACTOR'S NAME Kenneth Simmons		PERMIT NUMBER 002321 PM		DRILLERS NAME Rusty Bowles		PERMIT NUMBER 002497 WPM	
ABANDONMENT OF WELLS				WELL RECONSTRUCTION			
FORMER USE OF WELL <input type="checkbox"/> HAND DUG <input checked="" type="checkbox"/> SOIL BORING <input type="checkbox"/> DOMESTIC (1 TO 3 CONNECTIONS) <input type="checkbox"/> PUBLIC WATER SUPPLY <input type="checkbox"/> MULTI-FAMILY <input type="checkbox"/> MINERAL EXPLORATORY TEST HOLE <input type="checkbox"/> HEAT PUMP <input type="checkbox"/> MONITORING <input type="checkbox"/> IRRIGATION <input type="checkbox"/> OTHER				TYPE OF REPAIR <input type="checkbox"/> RAISED CASING <input type="checkbox"/> LINING OF WELL <input type="checkbox"/> DEEPENING OF WELL <input type="checkbox"/> OTHER			
ORIGINAL DRILLER (IF KNOWN) Rusty Bowles				DATE ORIGINALLY DRILLED 12/05/96			
DATE PLUGGED 12/05/96		STATIC WATER LEVEL NA FT		PUMP REMOVED FROM WELL? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		DIA. OF WELL CASING IN. <input type="checkbox"/> YES <input type="checkbox"/> NO	
DEPTH OF THE WELL 53.5 Feet		LENGTH OF CASING NA		CASING DIAMETER/WELL DIA NA		WAS WELL DISINFECTED AFTER RECONSTRUCTION <input type="checkbox"/> YES <input type="checkbox"/> NO	
GROUT INSTALLATION METHOD <input type="checkbox"/> GRAVITY <input checked="" type="checkbox"/> TREMIE <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		CASING CUT OFF THREE FEET BELOW SURFACE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		TYPE OF CASING <input type="checkbox"/> STEEL <input type="checkbox"/> PLASTIC <input checked="" type="checkbox"/> OTHER None		DATE RECONSTRUCTION COMPLETED	
GROUT MATERIAL USED <input type="checkbox"/> NEAT CEMENT <input checked="" type="checkbox"/> BENTONITE SLURRY <input type="checkbox"/> HI-EARLY <input type="checkbox"/> PORTLAND TYPE 1 <input type="checkbox"/> OTHER		BENTONITE <input checked="" type="checkbox"/> POWDER <input type="checkbox"/> GRANULAR <input type="checkbox"/> CHIPS <input type="checkbox"/> PELLETS		NUMBER OF BAGS OF GROUT USED 10		PURPOSE OF LINER <input type="checkbox"/> USED ONLY TO HOLD BACK FORMATION <input type="checkbox"/> USED TO SEAL OUT CONTAMINATION OR OTHER CONDITIONS	
POUNDS OF GROUT PER BAG 50		IF NEAT CEMENT USED, HOW MANY GALLONS OF WATER MIXED PER BAG OF CEMENT NA		TYPE OF FILL MATERIAL USED BENTONITE SLURRY		DIA. OF LINER IN.	
AMOUNT OF FILL MATERIAL USED 0.7 CU. YDS.		DEPTH TO TOP OF FILL MATERIAL 2 FT.		AMOUNT OF LINER USED FT.		WEIGHT OR SDR #	
WELL DISINFECTED BEFORE PLUGGING? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		NUMBER USED FOR DISINFECTION GALLONS OF CHLORINE NA POUNDS OF CHLORINE NA TABLETS OF CHLORINE NA		POSITION OF SEAL <input type="checkbox"/> FULL LENGTH <input type="checkbox"/> BETWEEN PACKERS		MATERIAL CEMENT: <input type="checkbox"/> PORTLAND TYPE 1 <input type="checkbox"/> HI-EARLY BENTONITE: <input type="checkbox"/> CHIPS <input type="checkbox"/> PELLETS <input type="checkbox"/> SLURRY <input type="checkbox"/> GRANULAR	
WAS THE WELL ABANDONED BECAUSE OF HOOKING UP TO A PUBLIC OR RURAL WATER SUPPLY DISTRICT? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		IF YES, WHAT IS THE NAME OF THE WATER DISTRICT? NA		DEPTH PUMP WAS SET FT.		DEPTH FROM SURFACE TO TOP OF THE GROUT SEAL FT.	
IF YES, WHAT IS THE NAME OF THE WATER DISTRICT? NA				DEPTH FROM SURFACE TO BOTTOM OF THE GROUT SEAL FT.			
CHECK THE BOX WHICH APPLIES				DEEPENING OF WELL INFORMATION			
<input checked="" type="checkbox"/> I HEREBY CERTIFY THAT THE WELL HEREIN DESCRIBED WAS ABANDONED IN ACCORDANCE WITH THE DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE ABANDONMENT OF WELLS		<input type="checkbox"/> I HEREBY CERTIFY THAT THE WELL HEREIN DESCRIBED WAS REPAIRED IN ACCORDANCE WITH THE DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE REPAIR OF WELLS		FROM		TO	
CONTRACTOR'S SIGNATURE Rusty Bowles		DATE 2-7-97		FORMATION DESCRIPTION		YIELD	



MISSOURI DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF GEOLOGY AND
LAND SURVEY
**MONITORING WELL
CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED	
REF. NO.	146366		
C.R. NO.		CHECK NO.	
STATE WELL NUMBER		TRANSMITTAL NO.	
CHECKED BY		ROUTE	
APPROVED BY		ENTERED	
		Ph 1	Ph 2
		Ph 3	

INFORMATION SUPPLIED BY MONITORING WELL CONTRACTOR			
SITE/FACILITY NAME <u>SWMU 12 / ARMCO</u>		WELL NUMBER <u>12 MW3</u>	
SITE ADDRESS <u>7000 Roberts STREET</u>		CITY <u>Kansas City</u>	STATE <u>MO</u>
OWNER NAME <u>ARMCO, INC. - Mr. Myrl Wear</u>		ZIP CODE <u>64125</u>	TELEPHONE <u>(816) 242-5855</u>
OWNER ADDRESS <u>7000 Roberts Street</u>		CITY <u>KANSAS CITY</u>	STATE <u>MO</u>
VARIANCE <input type="checkbox"/> YES ISSUED <input checked="" type="checkbox"/> NO		DATE ISSUED <u>NA</u>	LOCATION OF WELL SHOW LOCATION IN SECTION PLAT
VARIANCE NUMBER: <u>V NA</u>		COUNTY <u>JACKSON</u>	SURFACE ELEVATION <u>732.9</u>
DESCRIBE LOCATION OF THE WELL SO WE WOULD BE ABLE TO VISIT IT <u>Proceed East on Gravel Road South of Blue River at 2435</u> <u>For 1.1 mile, Turn South on Gravel Road, Proceed</u> <u>South for 0.2 mile.</u>			
		SMALLEST 1/4 <u>NE 1/4</u>	LARGEST 1/4 <u>SE 1/4</u>
		SEC. <u>29</u>	TWN. <u>50</u> N. RING. <u>32</u> E OR (W)
		LAT. _____	LONG. _____

MONITORING WELL INSTALLATION		PERMIT NUMBER <u>002321 PM</u>
CONTRACTOR'S NAME <u>Kenneth Simmons</u>		PERMIT NUMBER <u>002497 WPM</u>
DRILLING CONTRACTOR'S NAME <u>Rusty Bowles</u>		

WELL CONSTRUCTION INFORMATION							
TYPE OF WELL <input checked="" type="checkbox"/> MONITORING WELL <input type="checkbox"/> PIEZOMETER <input type="checkbox"/> OTHER	TYPE OF POTENTIAL SITE <input type="checkbox"/> HAZARDOUS MATERIAL <input type="checkbox"/> LANDFILL <input checked="" type="checkbox"/> OTHER <u>L.U.S.T. former Sludge Pond</u>		MONITORING FOR: (CHECK ALL THAT APPLY) <input checked="" type="checkbox"/> V.O.C. <input checked="" type="checkbox"/> METALS <input checked="" type="checkbox"/> PETROLEUM PRODUCT <input checked="" type="checkbox"/> OTHER <u>S.V.O.C.</u> ONLY				
PRO-TECTIVE CASING DETAILS (IF USED) LENGTH <u>5</u> FT.	DIAMETER OF CASING <u>4</u> IN.	WEIGHT OR SDR # <u>NA</u>	DIAMETER AND DEPTH OF DRILL HOLE <u>48</u> IN. <u>2</u> FT.	JOINTS <input type="checkbox"/> MECHANICAL <input type="checkbox"/> WELDED <input checked="" type="checkbox"/> OTHER <u>NONE</u>	MATERIAL <input type="checkbox"/> THERMO PLASTIC <input checked="" type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER	LOCKING CAP? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
CAP VENTED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	WEEP HOLE? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	CASING GROUT DETAILS <input type="checkbox"/> CEMENT <input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER	DEPTH FROM THE SURFACE TO THE BOTTOM OF THE CASING GROUT SEAL <u>2</u> FT.	TYPE OF SURFACE COMPLETION <input checked="" type="checkbox"/> ABOVE GROUND <input type="checkbox"/> FLUSH MOUNT	DESCRIBE HOW THE FLUSH MOUNT WAS CONSTRUCTED		
CENTRALIZER USED ON RISER <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	LOCATED AT		MATERIAL <input type="checkbox"/> STAINLESS STEEL <input type="checkbox"/> OTHER				
RISER PIPE DETAILS LENGTH <u>14.7</u> FT.	DIAMETER OF RISER PIPE <u>2</u> IN.	WEIGHT OR SDR # <u>SCH. 40</u>	DIAMETER OF DRILL HOLE <u>8</u> IN.	JOINTS <input type="checkbox"/> MECHANICAL <input checked="" type="checkbox"/> THREADED <input type="checkbox"/> WELDED <input type="checkbox"/> OTHER	MATERIAL <input type="checkbox"/> STEEL <input checked="" type="checkbox"/> THERMO PLASTIC <input type="checkbox"/> FLUORO POLYMER		
ANNULAR SEAL <input type="checkbox"/> CEMENT SLURRY <input type="checkbox"/> BENTONITE SLURRY <input checked="" type="checkbox"/> NON SLURRY BENTONITE TYPE: <u>Moist Plug CHIPS</u>	<input type="checkbox"/> CEMENT/BENTONITE SLURRY BAGS OF CEMENT USED % BENTONITE USED WATER USED/BAG GAL.		BENTONITE SEAL <input type="checkbox"/> SLURRY <input checked="" type="checkbox"/> CHIPS <input type="checkbox"/> GRANULAR <input type="checkbox"/> PELLETS	LENGTH OF SEAL <u>7.5</u> FT.	BENTONITE SEAL INSTALLED IN <input checked="" type="checkbox"/> UNSATURATED ZONE <input type="checkbox"/> SATURATED ZONE		
PRIMARY FILTER PACK TYPE <input checked="" type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input type="checkbox"/> NATURAL	GRAIN SIZE <u>20/40</u>	LENGTH OF FILTER PACK <u>14</u> FT.	METHOD OF INSTALLATION <u>Pour through 4" Has Stem Augers</u>	Information in this column to be supplied in the Feet from Surface column	FEET FROM SURFACE	FORMATION DESCRIPTION	
SECONDARY FILTER PACK TYPE <input type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input checked="" type="checkbox"/> NONE	GRAIN SIZE	LENGTH OF FILTER PACK	METHOD OF INSTALLATION	Depth to bottom of Protective Casing Seal:	<u>2.0</u>	<u>0-1.5</u> SLAG GRAVEL	
WELL SCREEN LENGTH OF SCREEN <u>10</u> FT.	DIAMETER <u>2</u> IN.	SLOT SIZE <u>0.010</u>	WEIGHT OR SDR # <u>SCH. 40</u>	MATERIAL <input checked="" type="checkbox"/> PLASTIC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER	Depth to Base of Annular Seal:	<u>9.5</u>	<u>14-22.5</u> SAND, some clay and silt
SUMP DETAILS LENGTH OF SUMP <u>0.5</u>	DIAMETER OF SUMP <u>2</u> IN.	MATERIAL <input checked="" type="checkbox"/> PVC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER <input type="checkbox"/> OTHER		Depth to Base of Bentonite Seal:	<u>9.5</u>	<u>very fine to coarse GRAINED</u>	
BACK FILL WAS THE WELL BACK FILLED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	MATERIAL USED <u>20/40 SAND</u>	LENGTH OF BACK FILLED BORE HOLE <u>2</u> FT.		Depth to Top of Primary Filter Pack:	<u>9.5</u>	<u>22.5-23.5</u> CLAY, High Plasticity, loose, thin bedded	
STATIC WATER LEVEL <u>15.40</u>	FEET FROM MEASURING POINT	MULTIPLE CASING WELLS		Depth to Top of the Screen:	<u>11.5</u>		
DATE OF STATIC WATER LEVEL <u>12/11/96</u>	SUBMIT ADDITIONAL AS BUILT DIAGRAM SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE AND SIZE OF ALL CASING, HOLE DIAMETERS, AND GROUT USED.		DRILLING EQUIPMENT <input type="checkbox"/> AIR ROTARY <input checked="" type="checkbox"/> AUGER TYPE <u>Hollow Stem</u>		Depth to Bottom of the Screen:	<u>21.5</u>	
MEASURING POINT FOR STATIC WATER LEVEL IS <input checked="" type="checkbox"/> TOP OF RISER PIPE <input type="checkbox"/> OTHER	ELEVATION OF MEASURING POINT <u>735.58</u>		<input type="checkbox"/> REVERSE ROTARY		Total Depth:	<u>23.5</u>	
DATE WELL DRILLING WAS COMPLETED <u>1/9/97</u>							

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.

SIGNATURE PRIMARY CONTRACTOR/PERMIT # <u>Kenneth Simmons</u> <u>002321 PM</u>	DATE <u>2/17/97</u>	SIGNATURE DRILLER/PERMIT # <u>Rusty Bowles</u> <u>002497 WPM</u>	DATE <u>2-7-97</u>
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ENCLOSE \$35 PER MONITORING WELL FOR THE CERTIFICATION FEE WITHIN 60 DAYS AFTER WELL COMPLETION



MISSOURI DEPARTMENT OF
NATURAL RESOURCES
DIVISION OF GEOLOGY AND
LAND SURVEY
**MONITORING WELL
CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED	
REF. NO.	146367		
C.R. NO.		CHECK NO.	
STATE WELL NUMBER		TRANSMITTAL NO.	
CHECKED BY		ROUTE	
APPROVED BY		ENTERED	
		Ph 1	Ph 2 Ph 3

INFORMATION SUPPLIED BY MONITORING WELL CONTRACTOR

SITE/FACILITY NAME <u>12mw SWMU 12/ARMCO</u>		WELL NUMBER <u>12mw 4</u>	
SITE ADDRESS <u>7000 Roberts Street</u>		CITY <u>KANSAS CITY</u>	STATE <u>MO</u> ZIP CODE <u>64125</u>
OWNER NAME <u>ARMCO, INC. - Mr. MYRL WEAR</u>		TELEPHONE <u>(816) 242-5855</u>	
OWNER ADDRESS <u>7000 Roberts Street</u>		CITY <u>KANSAS CITY</u>	STATE <u>MO</u> ZIP CODE <u>64125</u>
VARIANCE <input type="checkbox"/> YES ISSUED <input checked="" type="checkbox"/> NO	DATE ISSUED <u>NA</u> VARIANCE NUMBER: <u>V NA</u>	LOCATION OF WELL SHOW LOCATION IN SECTION PLAT COUNTY <u>JACKSON</u> SURFACE ELEVATION <u>738.8</u>	
DESCRIBE LOCATION OF THE WELL SO WE WOULD BE ABLE TO VISIT IT <u>Proceed East on Gravel Road South of Blue River at 7435 for 1.1 mile, turn South on Gravel Road. Proceed South for 0.2 miles.</u>		SMALLEST 1/4 <u>SW</u> 1/4 <u>SW</u> 1/4 <u>SE</u> 1/4 <u>SE</u> 1/4 SEC. <u>29</u> TWN. <u>50</u> N. R. <u>32</u> E. OF <u>(W)</u> LAT. _____ ° _____ ' _____ " LONG. _____ ° _____ ' _____ "	

MONITORING WELL INSTALLATION

CONTRACTOR'S NAME <u>Kenneth Simmons</u>	PERMIT NUMBER <u>002321 PM</u>
DRILLING CONTRACTOR'S NAME <u>Rusty Bowles</u>	PERMIT NUMBER <u>002497 WPM</u>

WELL CONSTRUCTION INFORMATION

TYPE OF WELL <input checked="" type="checkbox"/> MONITORING WELL <input type="checkbox"/> PIEZOMETER <input type="checkbox"/> OTHER	TYPE OF POTEN- TIAL SITE <input type="checkbox"/> HAZARDOUS MATERIAL <input type="checkbox"/> LANDFILL <input checked="" type="checkbox"/> OTHER <input type="checkbox"/> L.U.S.T. <u>Former Sludge Pond</u>		MONITORING FOR: (CHECK ALL THAT APPLY) <input checked="" type="checkbox"/> V.O.C. <input checked="" type="checkbox"/> METALS <input checked="" type="checkbox"/> PETROLEUM PRODUCT <input checked="" type="checkbox"/> OTHER <u>S.V.O.C.</u> ONLY					
	PRO- TECTIVE CASING DETAILS (IF USED)	LENGTH <u>5</u> FT.	DIAMETER OF CASING <u>4</u> IN.	WEIGHT OR SDR # <u>NA</u>	DIAMETER AND DEPTH OF DRILL HOLE <u>48</u> IN. <u>2</u> FT.	JOINTS <input type="checkbox"/> MECHANICAL <input type="checkbox"/> THREADED <input checked="" type="checkbox"/> OTHER <u>NONE</u>	MATERIAL <input checked="" type="checkbox"/> STEEL <input type="checkbox"/> THERMO PLASTIC <input type="checkbox"/> FLUORO POLYMER	LOCKING CAP? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
CAP VENTED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		CASING GROUT DETAILS <input type="checkbox"/> CEMENT <input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER		DEPTH FROM THE SURFACE TO THE BOTTOM OF THE CASING GROUT SEAL <u>2</u> FT.		TYPE OF SURFACE COMPLE- TION <input checked="" type="checkbox"/> ABOVE GROUND <input type="checkbox"/> FLUSH MOUNT		DESCRIBE HOW THE FLUSH MOUNT WAS CONSTRUCTED
CENTRALIZER USED ON RISER <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES		LOCATED AT		MATERIAL <input type="checkbox"/> STAINLESS STEEL <input checked="" type="checkbox"/> OTHER				
RISER PIPE DETAILS	LENGTH <u>19.8</u> FT.	DIAMETER OF RISER PIPE <u>2</u> IN.	WEIGHT OR SDR # <u>SCH. 40</u>	DIAMETER OF DRILL HOLE <u>8</u> IN.	JOINTS <input type="checkbox"/> MECHANICAL <input type="checkbox"/> THREADED <input checked="" type="checkbox"/> OTHER	MATERIAL <input type="checkbox"/> STEEL <input checked="" type="checkbox"/> THERMO PLASTIC <input type="checkbox"/> FLUORO POLYMER		
ANNULAR SEAL	<input type="checkbox"/> CEMENT SLURRY <input type="checkbox"/> BENTONITE SLURRY <input checked="" type="checkbox"/> NON SLURRY BENTONITE TYPE: <u>Bentonite Plug</u>		<input type="checkbox"/> CEMENT/BENTONITE SLURRY BAGS OF CEMENT USED _____ % BENTONITE USED _____ WATER USED/BAG _____ GAL.		BENTONITE SEAL <input type="checkbox"/> SLURRY <input checked="" type="checkbox"/> CHIPS <input type="checkbox"/> GRANULAR <input type="checkbox"/> PELLETS	LENGTH OF SEAL <u>13.5</u>	BENTONITE SEAL INSTALLED IN <input checked="" type="checkbox"/> UNSATURATED ZONE <input type="checkbox"/> SATURATED ZONE	
PRIMARY FILTER PACK	TYPE <input checked="" type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input type="checkbox"/> NATURAL	GRAIN SIZE <u>20/40</u>	LENGTH OF FILTER PACK <u>12.5</u> FT.	METHOD OF INSTALLATION <u>Pour through Hollow Stem Auger</u>	Information in this column to be supplied in the Feet from Surface column	FEET FROM SURFACE	FORMATION DESCRIPTION	
SECONDARY FILTER PACK	TYPE <input type="checkbox"/> SAND <input type="checkbox"/> MANUFACTURED <input checked="" type="checkbox"/> NONE	GRAIN SIZE <u>X</u>	LENGTH OF FILTER PACK <u>X</u> FT.	METHOD OF INSTALLATION <u>X</u>	Depth to bottom of Protective Casing Seal:	<u>2.0</u>	<u>0-6.4 Silt, with Clay 6.4-7.5 Clay, with Silt 7.5-12.8 Silt, some Clay 12.8-13.4 Clay, some Silt 13.4-20 Silt, trace sand and clay</u>	
WELL SCREEN	LENGTH OF SCREEN <u>10</u> FT.	DIAMETER <u>2</u> IN.	SLOT SIZE <u>0.010</u>	WEIGHT OR SDR # <u>SCH. 40</u>	MATERIAL <input checked="" type="checkbox"/> PLASTIC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER	Depth to Base of Annular Seal:	<u>15.5</u>	<u>20-21.4 Clay, with Silt 21.4-31 SAND, trace Silt Very fine to coarse grained, well graded, clay seams</u>
SUMP DETAILS	LENGTH OF SUMP <u>0.5</u> FT.	DIAMETER OF SUMP <u>2</u> IN.	MATERIAL <input checked="" type="checkbox"/> PVC <input type="checkbox"/> STEEL <input type="checkbox"/> FLUORO POLYMER <input type="checkbox"/> OTHER	LENGTH OF BACK FILLED BORE HOLE <u>2</u> FT.	Depth to Top of Primary Filter Pack:	<u>15.5</u>	<u>31-32 SHale, light gray, with limestone gravel at top of rock</u>	
BACK FILL	WAS THE WELL BACK FILLED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	MATERIAL USED <u>Nat. Collapse Sand</u>	LENGTH OF BACK FILLED BORE HOLE <u>2</u> FT.		Depth to Top of the Screen:	<u>17.5</u>	<u>27.5</u>	
STATIC WATER LEVEL <u>28.20</u>		FEET FROM MEASURING POINT		MULTIPLE Cased Wells		SUBMIT ADDITIONAL AS BUILT DIAGRAM SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE AND SIZE OF ALL CASING, HOLE DIAMETERS, AND GROUT USED.		
DATE OF STATIC WATER LEVEL <u>12/11/96</u>		MEASURING POINT FOR STATIC WATER LEVEL IS <input checked="" type="checkbox"/> TOP OF RISER PIPE <input type="checkbox"/> OTHER		DRILLING EQUIPMENT <input type="checkbox"/> AIR ROTARY <input checked="" type="checkbox"/> AUGER TYPE <u>Hollow Stem</u> <input type="checkbox"/> REVERSE ROTARY <input type="checkbox"/> OTHER		Total Depth: <u>Drilled to 30', Sampled to 32'</u> DATE WELL DRILLING WAS COMPLETED <u>12/9/97</u>		
ELEVATION OF MEASURING POINT <u>740.90</u>								

I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH THE DEPARTMENT
OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.

SIGNATURE PRIMARY CONTRACTOR/PERMIT # <u>Kenneth Simmons</u> <u>002321 PM</u>	DATE <u>2/17/97</u>	SIGNATURE DRILLER/PERMIT # <u>Rusty Bowles</u> <u>002497 WPM</u>	DATE <u>2-7-97</u>
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MO 780-1415 (7-95)

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RECYCLED PAPER

APPENDIX F
MONITORING WELL DEVELOPMENT FORMS

Well Development Form

Page 1 of 1

Project Name: ARMCORFI		Project Number: 94-498-4-003-02		Well Number: 12MW1					
Project Information				Elevation of Well					
Facility Name: ARMCO Kansas City Facility				Ground Surface Elevation (GS): 733.3					
Location: N 336469.21		E 862815.21		Top of Casing Elevation (TOC): 735.83					
Well Information				Well Volume Calculation					
Date Well Installed: 12/04/96				$1 \text{ well volume} = (26.90 - 15.67) \times 0.0408 \times (2^2) = 1.8 \text{ gallons}$ $1 \text{ well volume (gallons)} = \text{initial height of water column (ft)} \times 0.0408 \times (\text{casing diameter (in)})^2$ $\text{initial height of water column (ft)} = \text{total depth (ft)} - \text{initial depth to water (ft)}$					
Total Depth of Well:		24.4 feet from GS							
Depth to Top of Screen:		13.9 feet from GS							
Length of Casing Screened:		10.00 feet							
Type of Formation Screened:									
Well Development Method									
Equipment:				Method Description:					
Surge		Bail	X						
Airlift		Pump							
Observations During Well Development									
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
12/09/96	10:20 AM	15.67	26.90	Gallons	Total				
				0.25	0.25	54.5	6.9	1230	sandy, muddy gray, sulfur odor
12/09/96	10:29 AM			3.0	3.25	55.1	6.9	1220	sandy, muddy gray, sulfur odor
12/09/96	10:35 AM			6.0	9.25	54.3	6.9	1200	sandy, muddy gray, sulfur odor
12/09/96	10:39 AM			10.0	19.25	55.4	6.9	1220	sandy, gray to dark brown, sulfur odor,
									developed dry
12/11/96	10:33 AM	15.94	26.66	1.0	1.00	55.0	6.8	1270	cloudy, brown/gray
12/11/96	10:35 AM			3.0	4.00	55.8	6.8	1220	very cloudy, gray, sulfur odor
12/11/96	10:39 AM			7.0	11.00	54.9	6.8	1230	very cloudy, brown/gray, purged dry

*from TOC unless otherwise noted in Remarks

091294 Form WCI OP6-1

Well Development Form

Page 1 of 1

Project Name: ARMCORFI		Project Number: 94-498-4-003-02		Well Number: 12MW2					
Project Information				Elevation of Well					
Facility Name: ARMCO Kansas City Facility				Ground Surface Elevation (GS): 733.2					
Location: N 336866.41		E 862807.01		Top of Casing Elevation (TOC): 735.67					
Well Information				Well Volume Calculation					
Date Well Installed: 12/05/96				$1 \text{ well volume} = (28.00 - 16.90) \times 0.0408 \times (2^2) = 1.8 \text{ gallons}$ $1 \text{ well volume (gallons)} = \text{intial height of water column (ft)} \times 0.0408 \times (\text{casing diameter (in)})^2$ $\text{intial height of water column (ft)} = \text{total depth (ft)} - \text{intial depth to water (ft)}$					
Total Depth of Well:		25.5 feet from GS							
Depth to Top of Screen:		15.0 feet from GS							
Length of Casing Screened:		10.00 feet							
Type of Formation Screened:									
Well Development Method									
Equipment:				Method Description:					
Surge		Bail	X						
Airlift		Pump							
Observations During Well Development									
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				
12/09/96	11:05 AM	16.90	28.00	0.25	0.25	54.1	6.9	1310	very cloudy, brown
12/09/96	11:12 AM			3.0	3.25	54.9	7.0	1280	very cloudy, brown
12/09/96	11:24 AM			6.0	9.25	54.7	6.9	1330	slightly cloudy, brown
12/09/96	11:30 AM			7.5	16.75	54.7	6.9	1350	slightly cloudy, brown, developed dry
12/11/96	10:59 AM	17.30	28.00	0.5	0.50	54.3	6.8	1240	slightly cloudy
12/11/96	11:01 AM			3.0	3.50	54.7	6.8	1230	cloudy, tan
12/11/96	11:05 AM			6.0	9.50	54.1	6.8	1340	slightly cloudy, tan, purged dry

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091294 Form WCI OP6-1

Well Development Form

Page 1 of 1

Project Name: ARMCORFI		Project Number: 94-498-4-003-02		Well Number: 12MW3					
Project Information				Elevation of Well					
Facility Name: ARMCO Kansas City Facility				Ground Surface Elevation (GS): 732.9					
Location: N 337104.19		E 863108.07		Top of Casing Elevation (TOC): 735.58					
Well Information				Well Volume Calculation					
Date Well Installed: 12/06/96				$1 \text{ well volume} = (25.20 - 15.36) \times 0.0408 \times (2^2) = 1.6 \text{ gallons}$ $1 \text{ well volume (gallons)} = \text{intial height of water column (ft)} \times 0.0408 \times (\text{casing diameter (in)})^2$ $\text{intial height of water column (ft)} = \text{total depth (ft)} - \text{intial depth to water (ft)}$					
Total Depth of Well: 22.3 feet from GS									
Depth to Top of Screen: 11.8 feet from GS									
Length of Casing Screened: 10.00 feet									
Type of Formation Screened:									
Well Development Method									
Equipment:				Method Description:					
Surge		Bail	X						
Airlift		Pump							
Observations During Well Development									
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				
12/09/96	11:50 AM	15.36	25.20	0.25	0.25	56.7	6.8	1540	very cloudy, brown
12/09/96	11:54 AM			3.0	3.25	56.7	6.8	1420	very cloudy, brown, slight sulfur odor
12/09/96	11:58 AM			5.0	8.25	56.7	6.8	1330	very cloudy, brown, slight sulfur odor,
									developed dry
12/11/96	09:58 AM	15.40	25.20	0.5	0.50	55.8	6.8	1630	slightly cloudy, no odor
12/11/96	10:03 AM			2.5	3.00	56.1	6.7	1620	cloudy, tan
12/11/96	10:06 AM			4.5	7.50	56.3	6.8	1430	very cloudy, tan, purged dry

*from TOC unless otherwise noted in Remarks

091294 Form WCI OP6-1

Well Development Form

Page 1 of 1

Project Name: ARMCORFI		Project Number: 94-498-4-003-02		Well Number: 12MW4					
Project Information				Elevation of Well					
Facility Name: ARMCO Kansas City Facility				Ground Surface Elevation (GS): 738.8					
Location: N 336627.82		E 863239.11		Top of Casing Elevation (TOC): 740.90					
Well Information				Well Volume Calculation					
Date Well Installed: 12/06/96				1 well volume = (30.30-23.43) x 0.0408 x (2^2) = 1.1 gallons					
Total Depth of Well: 28.4 feet from GS				1 well volume (gallons) = initial height of water column (ft) x 0.0408 x (casing diameter (in))^2 initial height of water column (ft) = total depth (ft) - initial depth to water (ft)					
Depth to Top of Screen: 17.9 feet from GS									
Length of Casing Screened: 10.00 feet									
Type of Formation Screened:									
Well Development Method									
Equipment:				Method Description:					
Surge		Bail	X						
Airlift		Pump							
Observations During Well Development									
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				
12/09/96	12:25 PM	23.43	30.30	0.25	0.25	54.9	6.9	1390	very muddy, gray
12/09/96	12:30 PM			2.5	2.75	54.9	6.9	1340	very muddy, gray, sulfur odor
12/09/96	12:34 PM			5.5	8.25	55.1	6.9	1320	very silty, muddy, gray
12/11/96	11:24 AM	23.70	30.28	0.5	0.50	54.7	6.8	1310	slightly cloudy, no color
12/11/96	11:26 AM			2.0	2.50	54.7	6.8	1300	very cloudy, gray/black
12/11/96	11:27 AM			5.0	7.50	54.7	6.8	1290	very cloudy, gray/black

*from TOC unless otherwise noted in Remarks

091294 Form WCI OP6-1

Well Development Form

Page 1 of 1

Project Name: ARMCORFI		Project Number: 94-498-4-003-02		Well Number: OWA5					
Project Information				Elevation of Well					
Facility Name: ARMCO Kansas City Facility				Ground Surface Elevation (GS): 733.2					
Location: N 336976.37		E 863430.28		Top of Casing Elevation (TOC): 734.29					
Well Information				Well Volume Calculation					
Date Well Installed: 12/09/96				$1 \text{ well volume} = (25.10 - 14.85) \times 0.0408 \times (4^2) = 6.7 \text{ gallons}$ $1 \text{ well volume (gallons)} = \text{intial height of water column (ft)} \times 0.0408 \times (\text{casing diameter (in)})^2$ $\text{intial height of water column (ft)} = \text{total depth (ft)} - \text{intial depth to water (ft)}$					
Total Depth of Well:		feet from							
Depth to Top of Screen:		feet from							
Length of Casing Screened:		10 feet							
Type of Formation Screened:									
Well Development Method									
Equipment:				Method Description:					
Surge		Bail	X						
Airlift		Pump							
Observations During Well Development									
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				
12/09/96	01:00 PM	14.85	25.10	1.00	1.00	56.3	6.8	1600	slightly cloudy, brown
12/09/96	01:02 PM			6.0	7.00	55.9	6.7	1600	cloudy, brown
12/09/96	01:06 PM			7.0	14.00	55.6	6.8	1590	cloudy, sandy, rusty brown, developed dry
12/11/96	09:04 AM	15.29	25.20	0.5	0.50	54.9	6.5	1620	slightly cloudy
12/11/96	09:07 AM			5.0	5.50	55.8	6.6	1610	cloudy, light brown
12/11/96	09:10 AM			7.5	13.00	54.9	6.7	1630	cloudy, brown, purged dry

*from TOC unless otherwise noted in Remarks

091294 Form WCI OP6-1

Well Development Form

Page 1 of 1

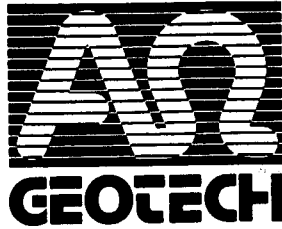
Project Name: ARMCORFI		Project Number: 94-498-4-003-02		Well Number: OWA6					
Project Information				Elevation of Well					
Facility Name: ARMCO Kansas City Facility				Ground Surface Elevation (GS): 732.8					
Location: N 337307.07		E 862768.07		Top of Casing Elevation (TOC): 734.73					
Well Information				Well Volume Calculation					
Date Well Installed: 12/09/96				1 well volume = $(23.95 - 14.36) \times 0.0408 \times (4^2) = 6.3$ gallons					
Total Depth of Well: feet from				$1 \text{ well volume (gallons)} = \text{intial height of water column (ft)} \times 0.0408 \times (\text{casing diameter (in)})^2$ $\text{intial height of water column (ft)} = \text{total depth (ft)} - \text{intial depth to water (ft)}$					
Depth to Top of Screen: feet from									
Length of Casing Screened: 10 feet									
Type of Formation Screened:									
Well Development Method									
Equipment:			Method Description:						
Surge		Bail	X						
Airlift		Pump							
Observations During Well Development									
Date	Time	Depth to Water* (ft)	Total Depth* (ft)	Fluid Removed		Temp. (degrees F)	pH (units)	S.C. (mS/cm)	Fluid Appearance and Remarks (turbidity, color, odor, etc.)
				Gallons	Total				
12/09/96	01:40 PM	14.36	23.95	1.00	1.00	56.3	6.7	1600	slightly cloudy, particulates, sulfur odor
12/09/96	01:45 PM			5.0	6.00	56.3	6.8	1700	feather cloudy, black particulates, sulfur odor
12/09/96	01:49 PM			7.0	13.00	55.9	6.9	1700	cloudy, black particles, black, sulfur odor
12/09/96	01:58 PM			10.0	23.00	55.6	6.8	1700	cloudy, black particles, black, sulfur odor,
									developed dry
12/11/96	09:34 AM	14.50	24.00	0.5	0.50	54.3	6.7	1320	slightly cloudy, slight sulfur odor
12/11/96	09:39 AM			6.5	7.00	54.9	6.7	1300	slightly cloudy, no color
12/11/96	09:41 AM			7.5	14.50	55.4	6.7	1350	very cloudy, black, sulfur odor, purged dry

*from TOC unless otherwise noted in Remarks

091294 Form WCI OP6-1

APPENDIX G

PHYSICAL ANALYSIS LABORATORY REPORT



January 14, 1997

GEOTECHNICAL SERVICES: DESIGN • CONSTRUCTION • FORENSIC

Ms. Denise Kazmierczak
Burns & McDonnell Waste Consultants, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114

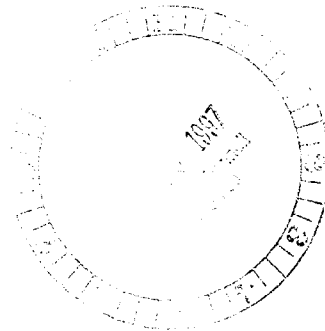
ARMCORFI TESTING (B&M NO. 94-498-4-003-02; A-OG 96-499T)

The results of laboratory testing for the above-referenced project are enclosed. If you have any questions regarding this information or require any further testing, please contact me at your convenience. We enjoy doing business with you.

Sincerely,
ALPHA-OMEGA GEOTECH, INC.

J. Allan Bush, E.I.T.
Geotechnical Engineer

lc



SUMMARY OF LABORATORY TESTING

PROJECT NAME: ARMCORFI TESTING
PROJECT LOCATION: _____

PROJECT NUMBER: B&M No. 94-498-4-003-02; A-OG 96-499T
DATE: 1/13/97

Boring Number	Sample Number	Depth or Elevation	Description	Natural Moisture (%)	Dry Unit Weight (pcf)	Atterberg Limits			USCS Class.	% Passing No. 200	Unconfined Compression PSF	%e	% Swell	Remarks
						LL	PL	PI						
12MW1	ST1	5-7'	Dark grayish-brown sandy SILT	18.1		NL	NP	NPI	ML	59.6				Total Organic Content = 2.0% See Cation Exchange Capacity Report
12MW1	SS1	18-20'	Dark brown sandy SILT	26.0		22	14	8	CL	57.9				Total Organic Content = 2.8% See Cation Exchange Capacity Report
12MW1	SS2	25-26'	Dark brown mottled gray CLAYEY SAND w/gravel	13.5		18	10	8	SC	31.3				Total Organic Content = 1.3% See Cation Exchange Capacity Report
12MW3	ST1	4-6'	Brown mottled black & light brown LEAN CLAY w/iron stains	10.9		47	19	28	CL	99.5				Total Organic Content = 1.5% See Cation Exchange Capacity Report
12MW3	ST2	8-10'	Dark brown mottled light brown FAT CLAY	30.4		70	22	48	CH	96.3				Total Organic Content = 1.9% See Cation Exchange Capacity Report
12MW3	CS1	14-19'	Dark brown CLAYEY SAND w/organics	28.7		23	16	7	SC	44.5				Total Organic Content = 1.3% See Cation Exchange Capacity Report

GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW1

SAMPLE No.: ST1

DEPTH: 5-7'

PERCENT PASSING No. 200: 59.6

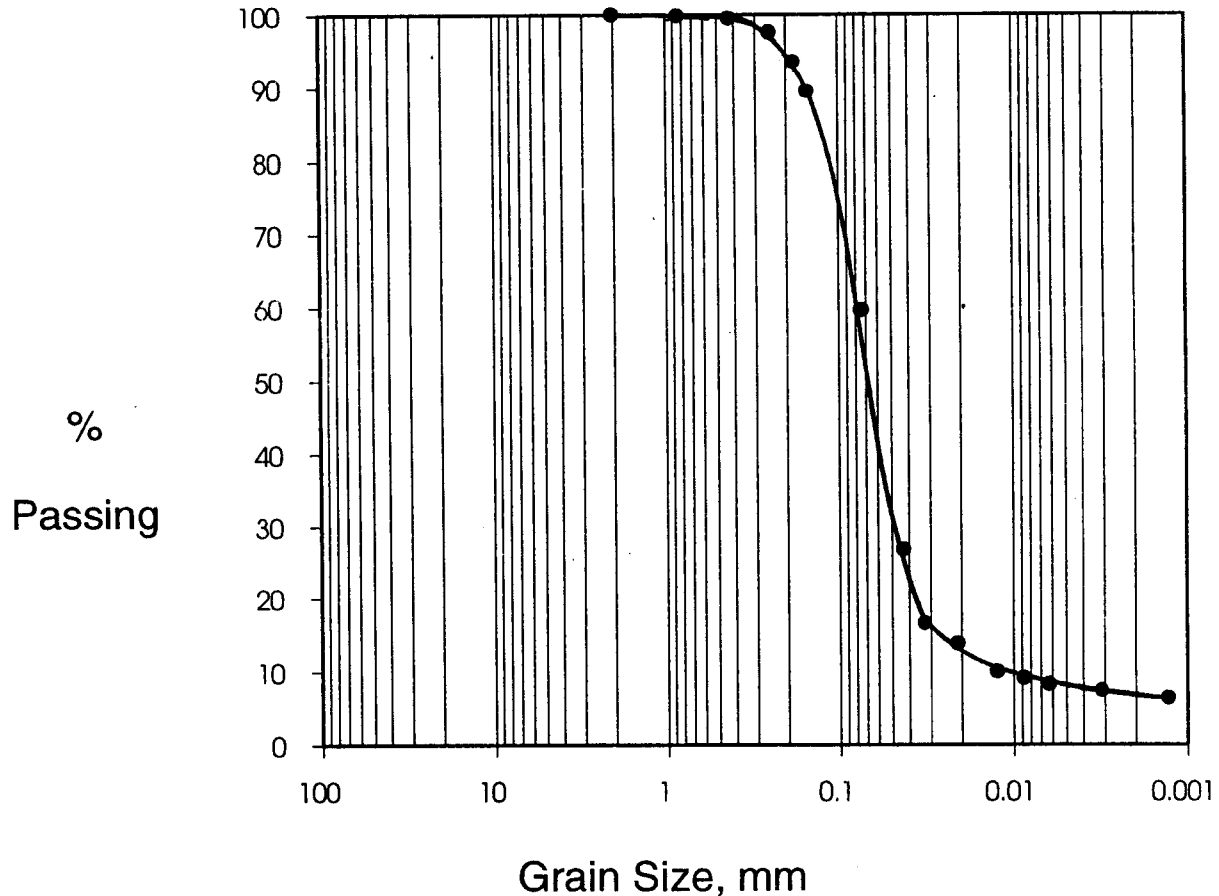
LIQUID LIMIT: NL

PLASTIC LIMIT: NP

PLASTICITY INDEX: NPI

CLASSIFICATION: ML

GRAIN SIZE DISTRIBUTION CURVE



Alpha-Omega Geotech, Inc.

SIEVE ANALYSIS (ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW1

SAMPLE No.: ST1

DEPTH: 5-7'

SIEVE SIZE	TOTAL % RETAINED	TOTAL % PASSING
Sieve Number 10	0.0	100.0
Sieve Number 20	0.2	99.8
Sieve Number 40	0.6	99.4
Sieve Number 60	2.5	97.5
Sieve Number 80	6.5	93.5
Sieve Number 100	10.5	89.5
Sieve Number 200	40.4	59.6

GRAIN SIZE ANALYSIS

(ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW1

SAMPLE No.: SS1

DEPTH: 18-20'

PERCENT PASSING No. 200: 57.9

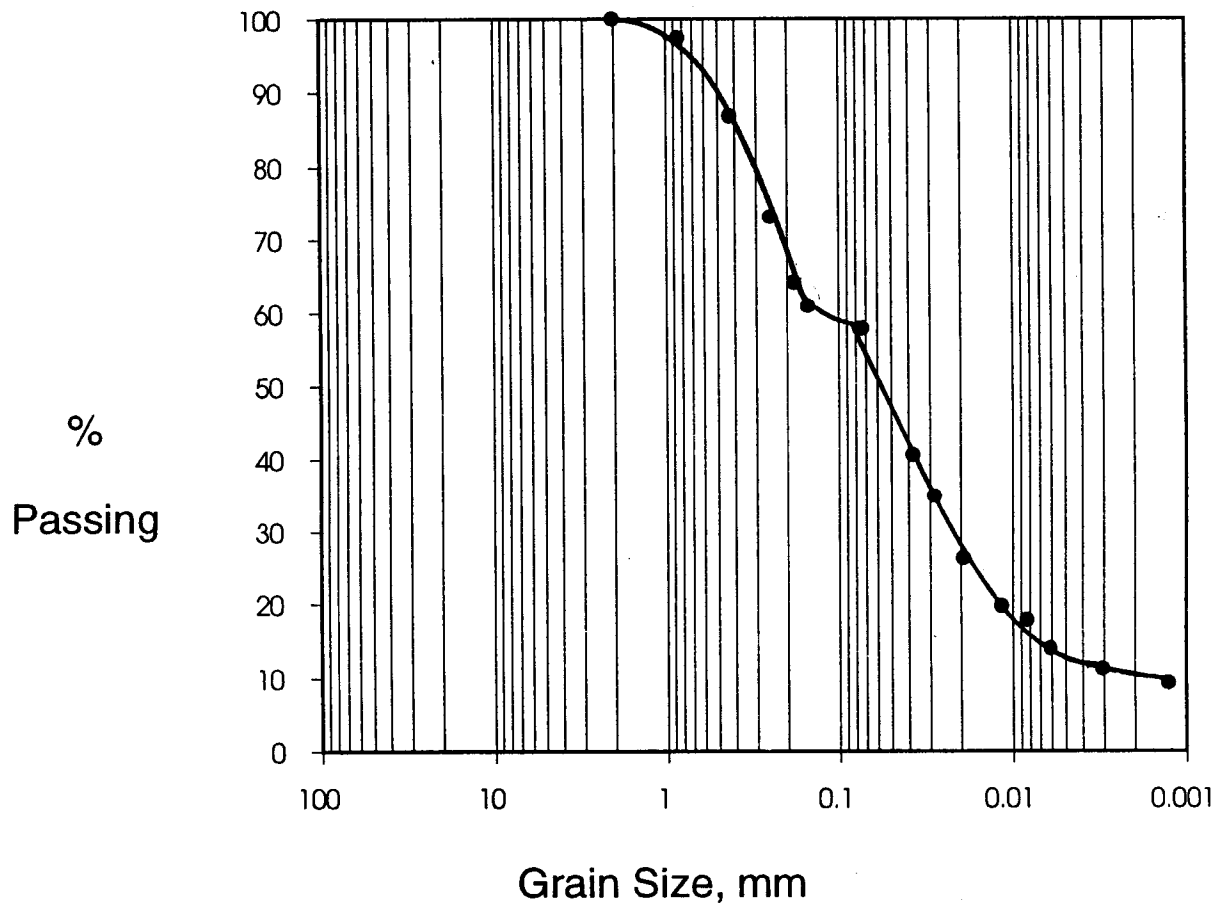
LIQUID LIMIT: 22

PLASTIC LIMIT: 14

PLASTICITY INDEX: 8

CLASSIFICATION: CL

GRAIN SIZE DISTRIBUTION CURVE



Alpha-Omega Geotech, Inc.

SIEVE ANALYSIS (ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW1

SAMPLE No.: SS1

DEPTH: 18-20'

SIEVE SIZE	TOTAL % RETAINED	TOTAL % PASSING
Sieve Number 10	0.0	100.0
Sieve Number 20	2.7	97.3
Sieve Number 40	13.2	86.8
Sieve Number 60	27.0	73.0
Sieve Number 80	35.8	64.2
Sieve Number 100	39.1	60.9
Sieve Number 200	42.1	57.9

GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW1

SAMPLE No.: SS2

DEPTH: 25-26'

PERCENT PASSING No. 200: 31.3

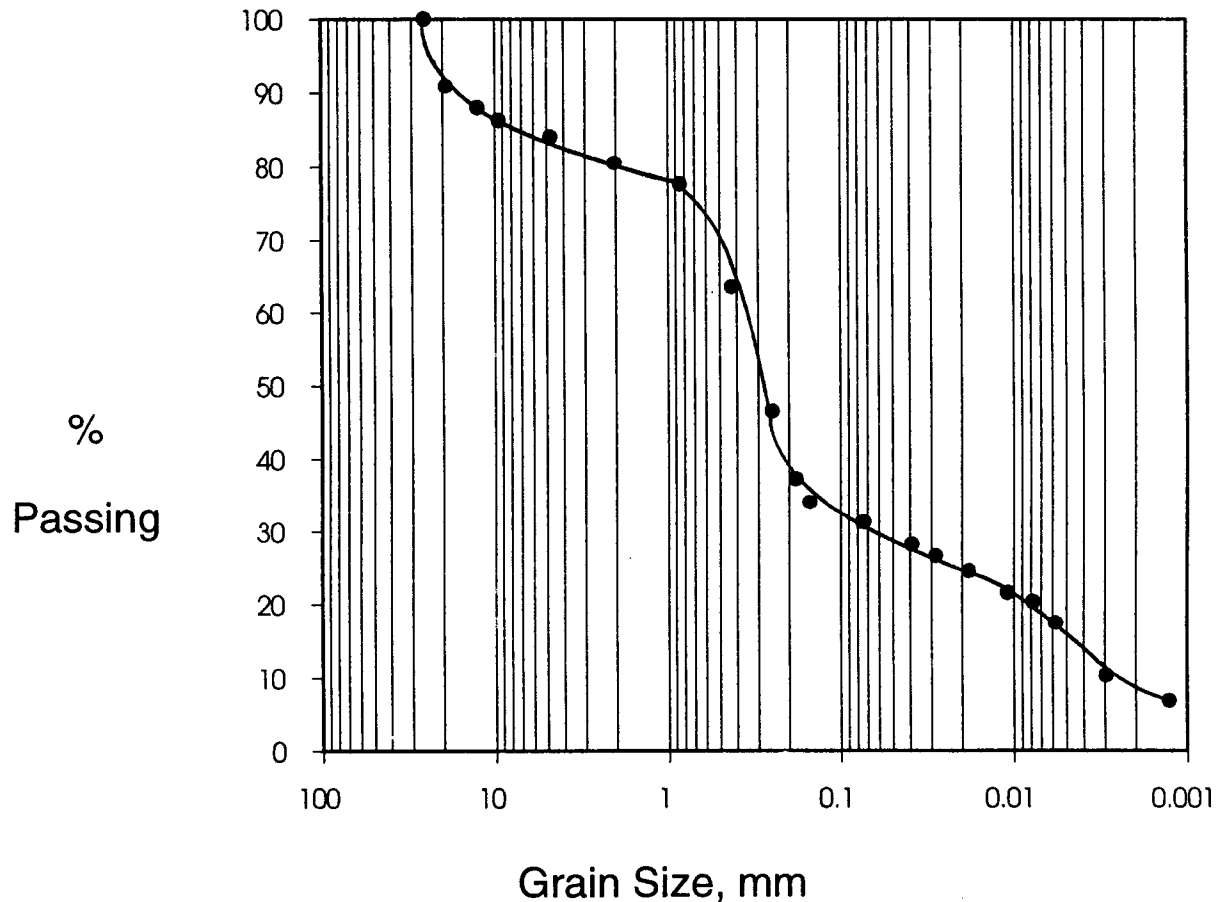
LIQUID LIMIT: 18

PLASTIC LIMIT: 10

PLASTICITY INDEX: 8

CLASSIFICATION: SC

GRAIN SIZE DISTRIBUTION CURVE



Alpha-Omega Geotech, Inc.

SIEVE ANALYSIS (ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW1

SAMPLE No.: SS2

DEPTH: 25-26'

SIEVE SIZE	TOTAL % RETAINED	TOTAL % PASSING
1 inch sieve	0.0	100.0
0.75 inch sieve	9.1	90.9
0.5 inch sieve	11.9	88.1
0.375 inch sieve	13.7	86.3
Sieve Number 4	15.9	84.1
Sieve Number 10	19.6	80.4
Sieve Number 20	22.5	77.5
Sieve Number 40	36.4	63.6
Sieve Number 60	53.4	46.6
Sieve Number 80	62.7	37.3
Sieve Number 100	66.0	34.0
Sieve Number 200	68.7	31.3

GRAIN SIZE ANALYSIS

(ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW3

SAMPLE No.: ST1

DEPTH: 4-6'

PERCENT PASSING No. 200: 99.5

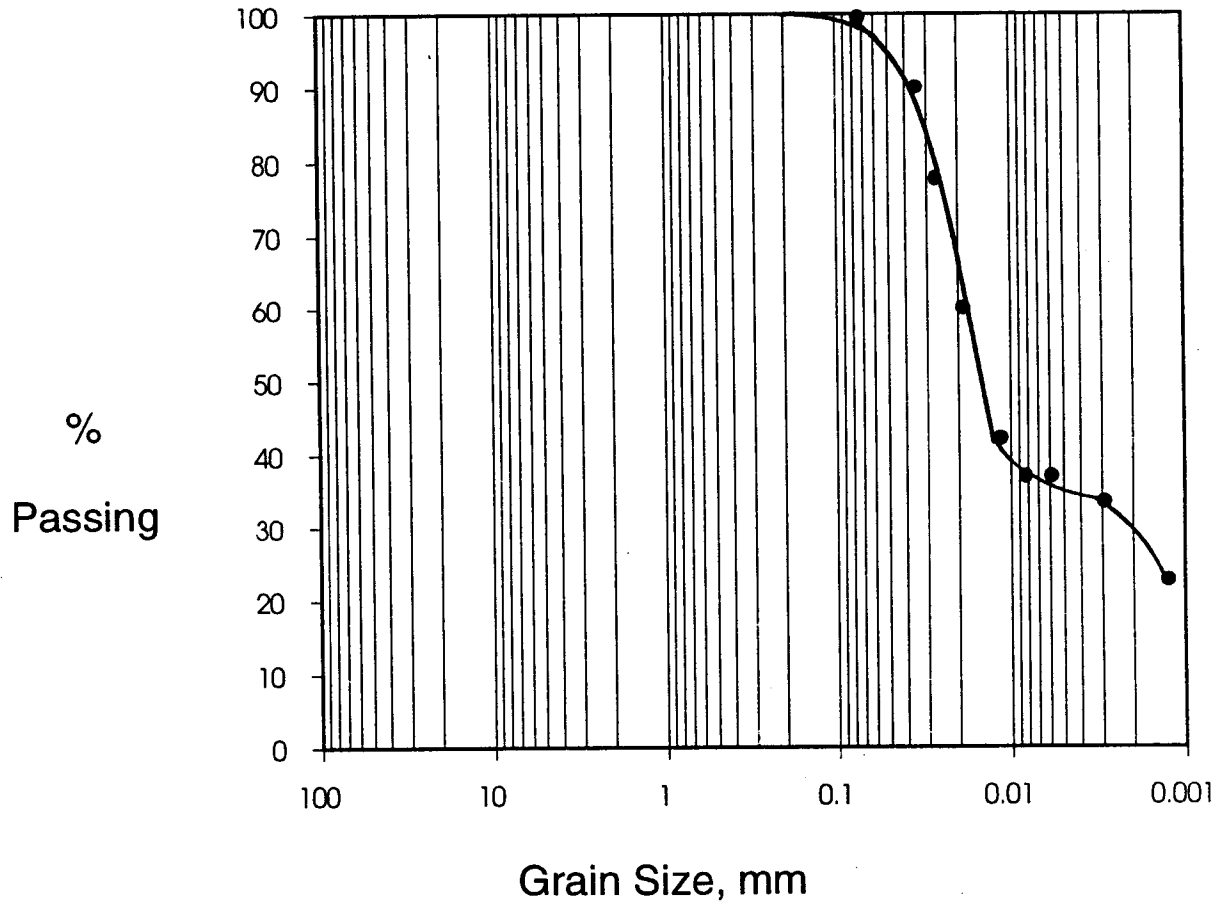
LIQUID LIMIT: 47

PLASTIC LIMIT: 19

PLASTICITY INDEX: 28

CLASSIFICATION: CL

GRAIN SIZE DISTRIBUTION CURVE



Alpha-Omega Geotech, Inc.

GRAIN SIZE ANALYSIS

(ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW3

SAMPLE No.: ST2

DEPTH: 8-10'

PERCENT PASSING No. 200: 96.3

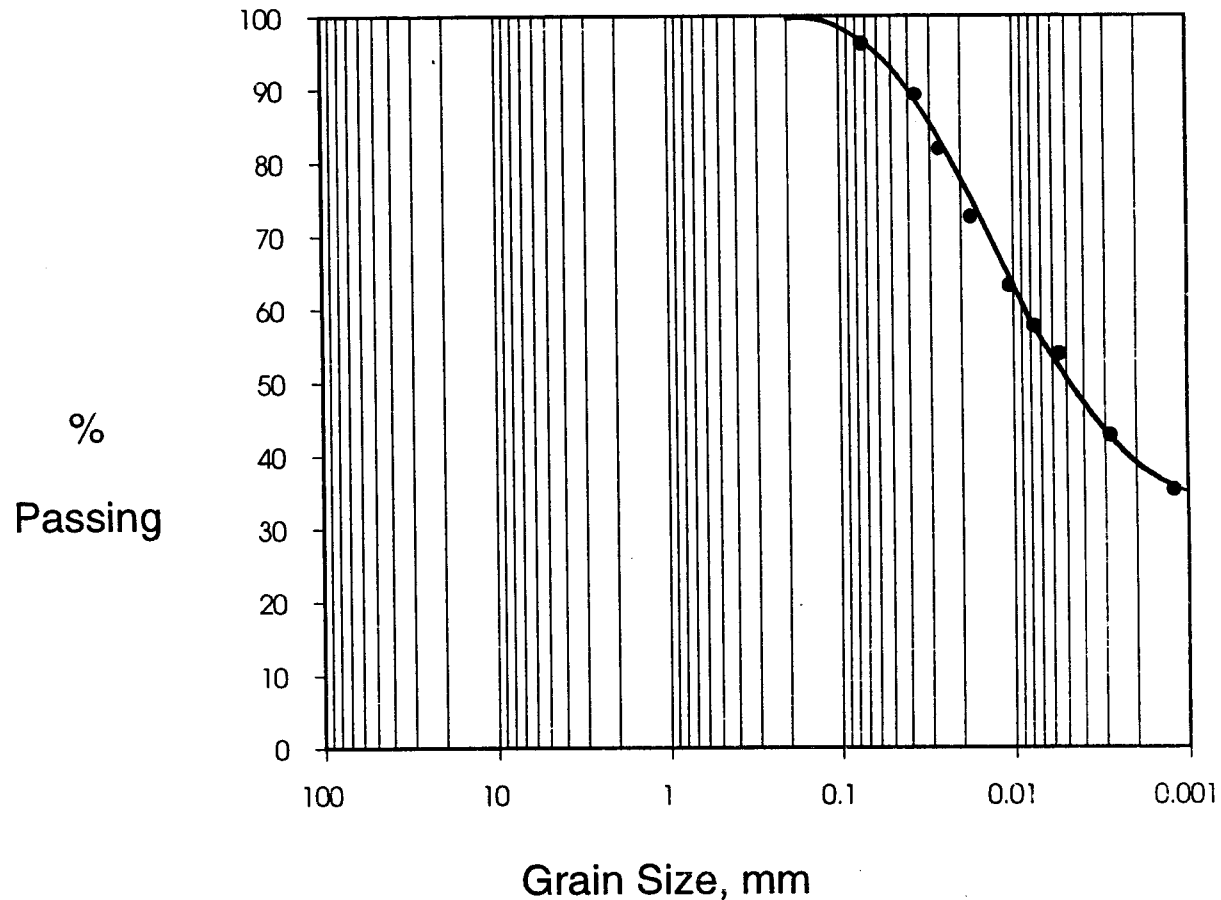
LIQUID LIMIT: 70

PLASTIC LIMIT: 22

PLASTICITY INDEX: 48

CLASSIFICATION: CH

GRAIN SIZE DISTRIBUTION CURVE



Alpha-Omega Geotech, Inc.

Alpha-Omega Geotech, Inc.

SIEVE ANALYSIS (ASTM D422)

PROJECT: ARMCORFI TESTING

PROJECT No.: 96-499T
B&M No.: 94-498-4-003-02

BORING No.: 12MW3

SAMPLE No.: CS1

DEPTH: 14-19'

SIEVE SIZE	TOTAL % RETAINED	TOTAL % PASSING
Sieve Number 10	0.0	100.0
Sieve Number 20	6.1	93.9
Sieve Number 40	23.2	76.8
Sieve Number 60	35.8	64.2
Sieve Number 80	45.0	55.0
Sieve Number 100	49.0	51.0
Sieve Number 200	55.5	44.5



Servi-Tech Laboratories

1816 E. Wyatt Earp • P.O. Box 1397 • Dodge City, Kansas 67801
Phone: 316-227-7123 • FAX: 316-227-2047

SOIL ANALYSIS REPORT

Sent To:	ALPHA-OMEGA GEOTECH INC	Lab No.:	
15271	1701 STATE AVE	Invoice No.:	D56453
	PO BOX 2670	Date Received:	12/19/96
	KANSAS CITY, KS 66110	Date Reported:	12/20/96

Results For:

Sample ID:

LAB #	SAMPLE ID	CEC (meq/100g)
19138	12MW1 ST-1 5'-7'	12.61
19139	12MW1 SS1 18'-20'	15.71
19140	12MW1 SS2 25'-26'	19.61
19141	12MW3 ST1 4'-6'	34.30
19142	12MW3 ST2 8'-10'	22.13
19143	12MW3 CS1 14'-19'	16.13

Ref. Royle

Q W A L L A B O R A T O R I E S , I N C .

2911 ROTARY TERRACE, P.O. BOX 562/PITTSBURG, KS 66762/(316)232-1970

LABORATORY REPORT:

REFERENCE #: 9701648

SENT ALPHA-OMEGA GEOTECH, INC.
TO: 1701 STATE AVE.
P.O. BOX 2670
KANSAS CITY, KS 66110
ALLAN BUSH

DATE REPORTED: 02/20/97
DATE COLLECTED: 01/29/97
DATE RECEIVED: 01/30/97

P.O. #:

PROJECT: ARMCORFI 96-499T

Sample ID: 12MW1 ST-1 5'-7'
Sample Date Collected: 01/29/97

Sample Matrix: SOIL

TEST	METHOD	RESULT	UNITS	MDL	ANALYZED BY
TOTAL ORGANIC CARBON	EPA 415.1	7150	MG/KG	0.1	02/18/97 CON

Sample ID: 12MW1 SS-1 18'-20'
Sample Date Collected: 01/29/97

Sample Matrix: SOIL

TEST	METHOD	RESULT	UNITS	MDL	ANALYZED BY
TOTAL ORGANIC CARBON	EPA 415.1	7110	MG/KG	0.1	02/18/97 CON

Sample ID: 12MW1SS-2 25'-26'
Sample Date Collected: 01/29/97

Sample Matrix: SOIL

TEST	METHOD	RESULT	UNITS	MDL	ANALYZED BY
TOTAL ORGANIC CARBON	EPA 415.1	9930	MG/KG	0.1	02/18/97 CON

Sample ID: 12MW3 ST-1 4'-6'
Sample Date Collected: 01/29/97

Sample Matrix: SOIL

TEST	METHOD	RESULT	UNITS	MDL	ANALYZED BY
TOTAL ORGANIC CARBON	EPA 415.1	10200	MG/KG	0.1	02/18/97 CON

Sample ID: 12MW3 ST-2 8'-10'
Sample Date Collected: 01/29/97

Sample Matrix: SOIL

TEST	METHOD	RESULT	UNITS	MDL	ANALYZED BY
TOTAL ORGANIC CARBON	EPA 415.1	12100	MG/KG	0.1	02/18/97 CON

REFERENCE #: 9701648

PAGE: 1

Sample ID: 12MW3 CS-1 14'-19'
Sample Date Collected: 01/29/97

Sample Matrix: SOIL

TEST	METHOD	RESULT	UNITS	MDL	ANALYZED BY
TOTAL ORGANIC CARBON	EPA 415.1	10000	MG/KG	0.1	02/18/97 CON

ND=NONE DETECTED

MDL=MINIMUM DETECTION LIMIT

SU=STANDARD UNITS

APPROVED BY:


TERRY KOESTER
LABORATORY DIRECTOR

APPENDIX H
SWMU 24 PHOTOIONIZATION DETECTOR READINGS
AND IMMUNOASSAY RESULTS

SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
Photoionization Detector Readings
Armco Kansas City Facility

Sample Point	Sample Depth below Ground Surface (feet)	Photoionization Detector Reading (ppm)
24T1H1	0 - 5	41.0
24T1H2	5 - 10	2.0
24T1H3	10 - 15	0.0
24T1H4	10	65.0
24T1H5	10	58.0
24T1H6	8 - 10	0.0
24T1H7	0 - 5	6.0
24T1H8	10 - 15	0.0
24T2H1	0 - 0.5	0.0
24T2H2	5 - 10	0.0
24T2H3	10 - 15	0.0
24T2H4	0 - 5	0.0
24T2H5	5 - 10	0.0
24T2H6	10 - 15	0.0
24T3H1	2	2.8
24T3H2	2	1.0
24T3H3	2	5.2
24T3H4	5	0.0
24T3H5	7	10.0
24T3H6	10.5	6.0
24T4H1	0 - 5	0.0
24T4H2	5 - 10	0.0
24T4H3	10 - 15	0.0
24T5H1	0 - 5	0.0
24T5H2	5 - 10	19.0
24T5H3	10 - 15	0.0
24T5H4	0 - 5	2.0
24T5H5	5 - 10	1.3
24T5H6	10 - 15	0.0
24T6H1	10 - 15	0.0
24T6H2	0 - 5	0.0

SWMU 24 - Waste Hydraulic and Lubricating Oil Storage Tanks (Armco)
Immuno Assay Readings
Armco Kansas City Facility

Sample Point	Sample Depth below Ground Surface (feet)	Immuno Assay Reading (%)
24T1I1	0 - 5	HIGH
24T1I2	5 - 10	41.0
24T1I3	10 - 15	LOW
24T1I4	10	32.0
24T1I5	10	34.0
24T1I6	8 - 10	LOW
24T1I7	0 - 5	LOW
24T1I8	10 - 15	LOW
24T2I1	15	5 (8-30)
24T2I2	0 - 5	LOW (<8)
24T2I3	5 - 10	41 (70-130)
24T2I4	10 - 15	13 (30-70)
24T2I5	5 - 10	25 (30-70)
24T2I6	10 - 15	LOW (<8)
24T3I1	10.5	LOW
24T3I2	5 - 10	16.0
24T3I3	0 - 5	11.0
24T4I1	0 - 5	LOW (<8)
24T4I2	5 - 10	8 (8-30)
24T4I3	10 - 15	LOW (<8)
24T5I1	0 - 5	16 (30-70)
24T5I2	5 - 10	18 (30-70)
24T5I3	10 - 15	LOW (<8)
24T6I1	0 - 5	18.0
24T6I2	5 - 10	56.0
24T6I3	10 - 15	59.0

APPENDIX I
CHAIN OF CUSTODY FORMS

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell Waste Consultants, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Laboratory

Inchape

Address

1089 E Collins Blvd

City/State/Zip

Richardson, TX 75081

Telephone

214-238-5591

Document Control No.:

Lab. Reference No. or
Episode No.:

WCIIN-088

Attention: James Greer

Project Number: 94-498-4-003-01

Project Name: Armcorfi

Sample Type

Site, Group, or SWMU Name: SWMU 24

Matrix

Sample Number

Sample Event

Sample Depth
(in feet)Sample
CollectedSample
PointSample
Designator

Round

Year

From

To

Date

Time

Liquid

Solid

Gas

Composite

Grab

Number of
ContainersAnalysis
TPH (C6-C32)

Remarks

246a

SR1

0

0.5

10/25/96

10/1/05

X

X

X

see special instructions

24-Hour

Turn around

Sampler (signature):

James Greer

Special Instructions: Modified 8015 widest

Sampler (signature):

1400

Range C6-C12 & C12-C32 24-HR Turn around

Relinquished By:

Date/Time

Relinquished By:

Date/Time

Condition of Shipping Container:

Ice Present in Container:

1. (signature):

13/15/96

(signature):

Good ☐ Fair ☐ Poor ☐Yes ☐ No ☐

Relinquished By:

Date/Time

Relinquished By:

Date/Time

Comments:

2. (signature):

(signature):

Request for Chemical Analysis and Chain of Custody Record																							
Burns & McDonnell Waste Consultants, Inc. 9400 Ward Parkway Kansas City, Missouri 64114 Phone: (816) 333-8787 Fax: (816) 822-3463				Laboratory <u>Inchape</u>								Document Control No.:											
				Address <u>1089 E Collins Blvd</u>								Lab. Reference No. or Episode No.: <u>WCTIN-088</u>											
Attention: <u>Denise Kazmierczak</u>				City/State/Zip <u>Richardson Tx 75081</u>								Telephone <u>214-238-5591</u>											
Project Number: <u>94-498-4-003-01</u>								Project Name: <u>ARMCORFI</u>								Sample Type							
Site, Group, or SWMU Name: <u>SWMU 10</u>												Matrix			Composite	Grab	Number of Containers	Analysis	Lead	Cadmium	TCLP Lead	TCLP Cadmium	Remarks
Sample Number		Sample Event		Sample Depth (in feet)		Sample Collected		Liquid	Solid	Gas													
Sample Point	Sample Designator	Round	Year	From	To	Date	Time																
1061	SR1		1996	0	0.5	10/29/96	1048		X		X		1	X	X					Do not run			
1061	SR1R						1050	X			X		1	X	X					TCLP Analysis			
1061	SR2			0.5	1		1110		X		X		1	X	X					at this time for			
1064	SR1			0	0.5		1130		X		X		1	X	X					all samples			
1065	SR1			0	0.5		1145		X		X		1	X	X								
1066	SR1			0	0.5		1200		X		X		1	X	X								
1064	SR2			0.5	1		1215		X		X		1	X	X								
1065	SR2		✓	0.5	1	✓	1230		X		X		1	X	X								
1066	SR2			0.5	1		1245		X		X		1	X	X								
1062	SR1			0	0.5		1410		X		X		1	X	X								
1062	SR2			0.5	1		1425		X		X		1	X	X								
1062	SR2D			0.5	1		1425		X		X		1	X	X								
1063	SR1			0	0.5		1445		X		X		1	X	X								
1063	SR1MS			0	0.5		1445		X		X		1	X	X								
1063	SR1MSD			0	0.5		1445		X		X		1	X	X								
1063	SR2		✓	0.5	1	✓	1500		X		X		1	X	X								
Sampler (signature): <u>James Green</u>								Special Instructions: <u>Only analyze for lead & cadmium, TCLP analysis will be needed for one sample at a later date.</u>															
Sampler (signature):								Condition of Shipping Container: Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> Ice Present in Container: Yes <input type="checkbox"/> No <input type="checkbox"/>															
Relinquished By: 1. <u>James Green</u>		Date/Time: <u>10/31/96</u>		Relinquished By: (signature):				Date/Time:				Comments:											
Relinquished By: 2. (signature):		Date/Time:		Relinquished By: (signature):				Date/Time:															

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell Waste Consultants, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Laboratory Inchape Testing
Address 1089 E Collins Blvd
City/State/Zip Richardson, TX

Document Control No.:

Lab. Reference No. or
Episode No.:

Attention: Denise Kazmierczak

Telephone

Project Number: 94-498-4-003-01 Project Name: Armcorfi

Sample Type

Site, Group, or SWMU Name: SWMU 25

Matrix

Sample Number		Sample Event		Sample Depth (in feet)		Sample Collected		Liquid	Solid	Gas	Composite	Grab	Number of Containers	Analysis				Remarks
Sample Point	Sample Designator	Round	Year	From	To	Date	Time							RCRA Metals	TPH	PAH	pH	
25B1	CS1		1996	0	2	11/4/96	1030		X		X		1	X	X	X	X	
25B1	CS2		1996	2	4		1035		X		X		1	X	X	X	X	
25B1	CS3			4	7		1045		X		X		1	X	X	X	X	
25B2	CS1			0	2		1115		X		X		1	X	X	X	X	
25B2	CS2			2	4		1120		X		X		1	X	X	X	X	
25B2	CS2D			2	4		1120		X		X		1	X	X	X	X	
25B2	CS2MS			2	4		1120		X		X		1	X		X	X	
25B2	CS2MSD			2	4		1120		X		X		1	X		X	X	
25B2	CS3			4	7		1130		X		X		1	X	X	X	X	
25B3	CS1			0	2		1140		X		X		1	X	X	X	X	
25B3	CS2			2	4		1145		X		X		1	X	X	X	X	
25B3	CS3			4	7		1150		X		X		1	X	X	X	X	
25B4	CS1			0	2		1220		X		X		1	X	X	X	X	
25B4	CS2			2	4		1225		X		X		1	X	X	X	X	
25B4	CS3			4	7		1240		X		X		1	X	X	X	X	

Sampler (signature): James Green

Sampler (signature):

Special Instructions:

Samples are in 2 coolers

Relinquished By:

Date/Time

Relinquished By:

Date/Time

1. James Green (signature)11/4/96

(signature):

Condition of Shipping Container:

Ice Present in Container:

Relinquished By:

Date/Time

Relinquished By:

Date/Time

2. (signature):

(signature):

Comments:

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell Waste Consultants, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Laboratory EnclaveAddress 1089 E Collins BlvdCity/State/Zip Richardson TX 75081

Telephone

Document Control No.:

Lab. Reference No. or
Episode No.:WCIIN-088Attention: Denise KazmierczakProject Number: 94-Y98-4-003-01Project Name: ARMCORFT

Sample Type

Site, Group, or SWMU Name: SWMU 25

Matrix

Sample Number		Sample Event		Sample Depth (in feet)		Sample Collected		Matrix			Composite	Grab	Number of Containers	Analysis				Remarks
Sample Point	Sample Designator	Round	Year	From	To	Date	Time	Liquid	Solid	Gas				RCRA Metals	TPH	PAH	pH	
25SB5	CS1		1996	0	2	11/4/96	1405		X		X		1	X	X	X	X	
25SB5	CS2			2	4		1410		X		X		1	X	X	X	X	
25SB6	CS1			0	2		1430		X		X		1	X	X	X	X	
25SB6	CS2			2	4		1445		X		X		1	X	X	X	X	
25SB7	CS1			0	2		1520		X		X		1	X	X	X	X	
25SB7	CS2			2	4		1530		X		X		1	X	X	X	X	
25SB7	CS3			4	5.5		1545		X		X		1	X	X	X	X	
25B4	CS3R						1250	X				X	6	X	X	X	X	
25SB8	CS1			0	2		1605		X		X		1	X	X	X	X	
25SB8	CS2			2	4		1615		X		X		1	X	X	X	X	
25SB8	CS3			4	7		1625		X		X		1	X	X	X	X	

Sampler (signature):

Sampler (signature):

Relinquished By:

1. James Green (signature):

Date/Time

11/4/96

Relinquished By:

(signature):

Date/Time

Relinquished By:

2. (signature):

Date/Time

Relinquished By:

(signature):

Date/Time

Special Instructions:

Samples are in
2 coolers

Condition of Shipping Container:

Good ☐ Fair ☐ Poor ☐

Ice Present in Container:

Yes ☐ No ☐

Comments:

[illegible]

Request for Chemical Analysis and Chain of Custody Record																				
Burns & McDonnell Waste Consultants, Inc. 9400 Ward Parkway Kansas City, Missouri 64114 Phone: (816) 333-8787 Fax: (816) 822-3463						Laboratory <u>Inchcape Testing</u>						Document Control No.:								
						Address <u>1089 East Collins Blvd.</u>						Lab. Reference No. or Episode No.: <u>UCIIN-088</u>								
Attention: <u>DENISE KATNIERCZAK</u>						City/State/Zip <u>Richardson, TX 75081</u>														
Telephone <u>(816) 822-3379</u>																				
Project Number: <u>94-498-4-003-01</u>						Project Name: <u>ARMCORFI</u>						Sample Type								
Site, Group, or SWMU Name: <u>SWMU 24</u>												Matrix								
Sample Number		Sample Event		Sample Depth (in feet)		Sample Collected		Liquid	Solid	Gas	Composite	Grab	Number of Containers	Analysis						Remarks
Sample Point	Sample Designator	Round	Year	From	To	Date	Time							VOC	PCRA METALS	TPH	PAH			
2473	SB1R			-	-	11/7/96	0905	X				X	9	X	X	X	X			
2473	SB1			0	5		0905		X		X		2	X	X	X	X			
2473	SB2			5	10		0855		X		X		2	X	X	X	X			
2473	SB3			10	15		0845		X		X		2	X	X	X	X			
2471	SB1			0	5		1000		X		X		2	X	X	X	X			
2471	SB2			5	10		1015		X		X		2	X	X	X	X			
2471	SB2D			5	10		1015		X		X		2	X	X	X	X			
2471	SB3			10	15		1030		X		X		2	X	X	X	X			
2471	SB4			0	5		1415		X		X		2	X	X	X	X			
2471	SB5			5	10		1420		X		X		2	X	X	X	X			
2471	SB6			10	15		1425		X		X		2	X	X	X	X			
Sampler (signature): <u>Kenneth Seaman</u>												Special Instructions:								
Sampler (signature):																				
Relinquished By: 1. <u>Ronald W. Elden</u> (signature)		Date/Time <u>11-7-96/1655</u>		Relinquished By: (signature):				Date/Time		Condition of Shipping Container: Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/>				Ice Present in Container: Yes <input type="checkbox"/> No <input type="checkbox"/>						
Relinquished By: 2. _____ (signature):		Date/Time		Relinquished By: (signature):				Date/Time		Comments:										

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell Waste Consultants, Inc.
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Laboratory Inchcape Testing
Address 1089 East Collins Blvd
City/State/Zip Richardson, TX 75081
Telephone (888) 487-5591

Document Control No.:

Lab. Reference No. or
Episode No.:

WC IZH-088Attention: Denise KazmierczakProject Number: 44-498-H-003-01Project Name: ARMCORFI

Sample Type

Site, Group, or SWMU Name: SWMU 24

Matrix

Sample Number		Sample Event		Sample Depth (in feet)		Sample Collected		Liquid	Solid	Gas	Composite	Grab	Number of Containers	Analysis						Remarks
Sample Point	Sample Designator	Round	Year	From	To	Date	Time							VOC	PCRA METALS	TPH	PAH			
2472	SB-1			0	5	11-8-96	0944		X		X		2	X	X	X	X			
2472	SB-2			5	10	11-8-96	0945		X		X		2	X	X	X	X			
2472	SB-3			10	15	11-8-96	10:00		X		X		2	X	X	X	X			
2474	SB-1			0	5	11-8-96	12:48		X		X		2	X	X	X	X			
2474	SB-2			5	10	11-8-96	12:42		X		X		2	X	X	X	X			
2474	SB-3			10	15	11-8-96	12:30		X		X		2	X	X	X	X			
2474	SB-3MS/MSD			10	15	11-8-96	12:30		X		X		4	X	X	X	X			matrix Spike AND matrix Spike Duplicate
TB	110896			-	-	11-8-96	12:15	X				X	2	X						Lab. Prepared Trip Blank
2474	SB3R			-	-	11-8-96	13:00	X				X	9	X	X	X	X			
2475	SB-1			0	5	11-8-96	1505		X		X		2	X	X	X	X			
2475	SB-2			5	10	11-8-96	1510		X		X		2	X	X	X	X			
2475	SB-3			10	15	11-8-96	1515		X		X		2	X	X	X	X			
2476	SB-1			0	5	11-8-96	1715		X		X		2	X	X	X	X			
2476	SB-2			5	10	11-8-96	1708		X		X		2	X	X	X	X			
2476	SB-2D			5	10	11-8-96	1710		X		X		2	X	X	X	X			
2 PT																				

Sampler (signature): Kenneth Simmons

Special Instructions:

Sampler (signature):

Relinquished By: W. Elder
1. (signature):Date/Time
11-8-96/1730

Relinquished By:

(signature):

Date/Time

Condition of Shipping Container:

Good ☐ Fair ☐ Poor ☐

Ice Present in Container:

Yes ☐ No ☐

Relinquished By:

(signature):

Date/Time

Relinquished By:

(signature):

Date/Time

Comments:

[illegible]

[illegible]